LITHOSPHERE

Landforms

The Korean Peninsula is surrounded by water on three sides. In contrast to its smooth eastern coastline, its southern and western coastlines are extremely complex. The Peninsula has relatively long coastlines for its size. According to a 2014 survey, the total coastline of the mainland is 7,753 km, while the coastlines of Korea's associated islands constitute 7,210 km. Artificial coastlines resulting from coastal development and port construction have reached 5,086 km.

One of the most significant geographic characteristics of the Korean Peninsula is its prominent NNW-SSE oriented mountain ranges: Nangnimsanmaek (Nangnim Mountain Range) and Taebaeksanmaek (Taebaek Mountain Range). These mountain ranges resulted from the formation of a back-arc basin on the edge of the Asian continent, a process that also produced the Hamgyeongsanmaek (Hamgyeong Mountain Range) and the Sikhote-Aline Mountain Range in Russia. The Ulleung Basin, located in the East Sea, was formed due to the Taebaeksanmaek uplift.

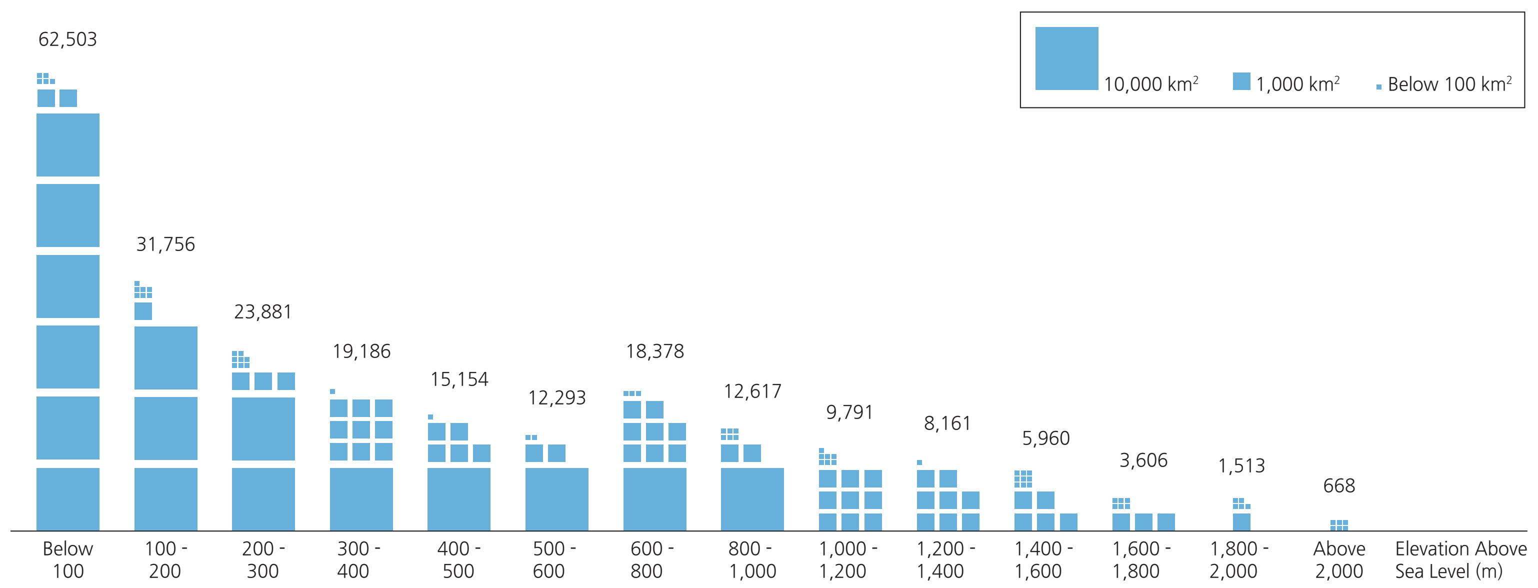
The average elevation of the Korean Peninsula is approximately 448 m above sea level, which is notably lower than that of East Asia (910 m). The mean slope of the Peninsula is 5.7˚, which is two degrees steeper than the mean of East Asia (3.9˚). Overall, while the Peninsula has a lower elevation than that of East Asia, it has a significant spread of steep mountainous regions, with 77.4% of South Korea covered in mountainous areas that are less than 400 m in elevation.

High mountains are asymmetrically located to the east and north of the Peninsula, following the ranges of Taebaeksanmaek, Nangnimsanmaek, and Hamgyeongsanmaek. The last two ranges contain the highest peaks; Dojeongsan, Kwanmobong, and Duryusan of Hamgyeongsanmaek and Heesaekbong, Maengbusan, and Nangnimsan of Nangnimsanmaek are all peaks that stand over 2000 m. On the other hand, Taebaeksanmaek—which runs 500 km from Youngheung Bay in North Korea to Busan in South Korea—has a much lower elevation. Major mountains such as Geumgangsan, Seoraksan, and Odaesan are about 1,500–1,700 m high.

Toward the southern part of the Peninsula, granite is distributed in circular or girdle-shaped areas between metamorphic rocks. Well-developed erosional basins form on the granite and are encircled by high peaks of metamorphic rocks. These erosional basins characteristically include transit zones with gentle slopes of 1–10˚ that are located between steep mountains and flat plains.

Because Taebaeksanmaek and Hamgyeonsanmaek are located in the eastern region of the Korean Peninsula, most large rivers flow southwest from the major watersheds of the mountain ranges. Meanwhile, streams that lead into the East Sea on the steeper eastern slopes of the ranges are shorter. This disparity is a central characteristic of rivers on the Korean Peninsula. Due to the Peninsula's relatively high average slope and a significant seasonal difference in precipitation, Korean rivers are also characterized by a high coefficient of river regime; this means that even if most rivers display wide valleys and gentle gradients, the rivers have an inconsistent seasonal flow.

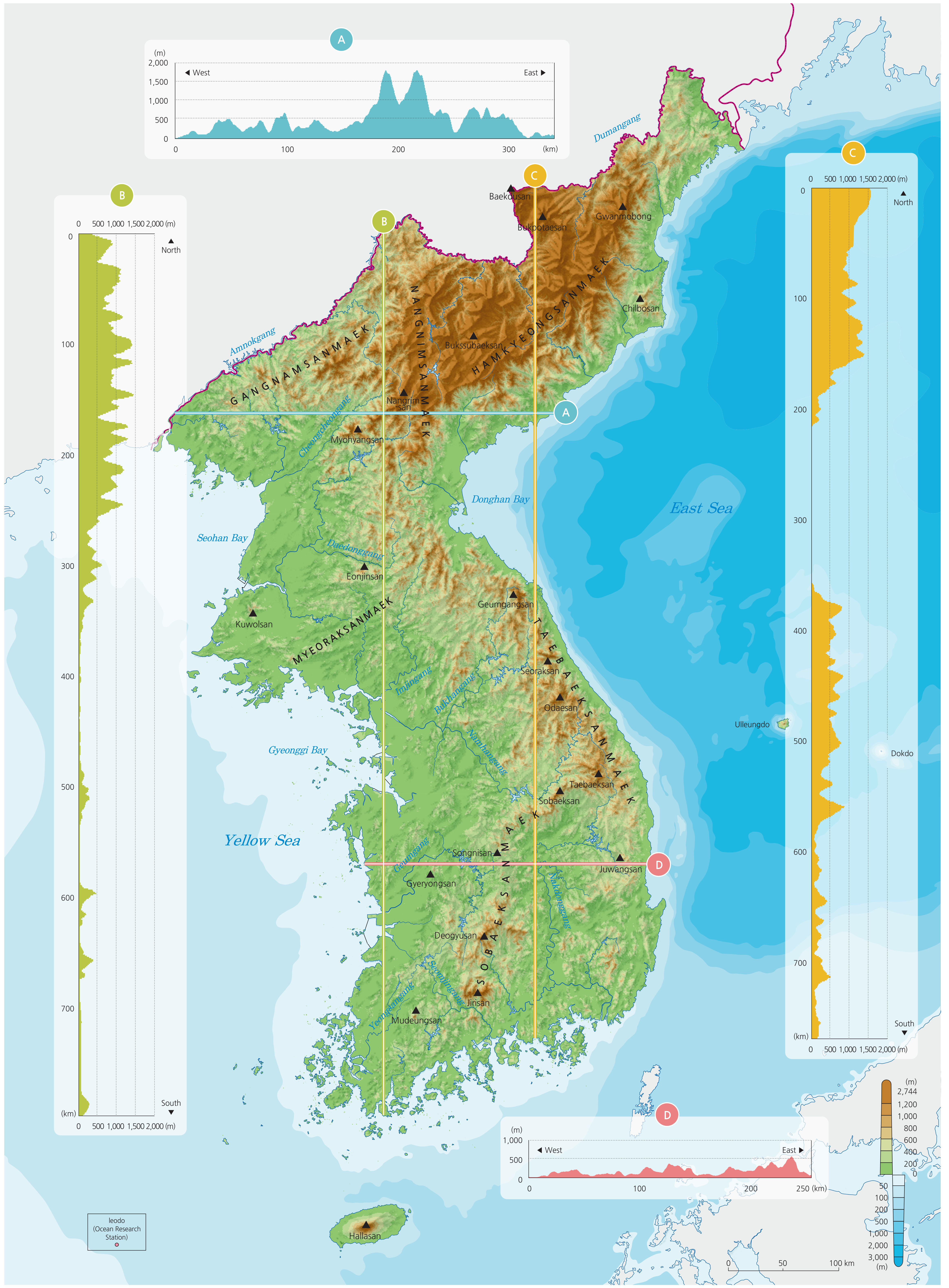
Total Area by Elevation in the Korean Peninsula



National Geographic Information Institute (2018)

Landforms of Korea

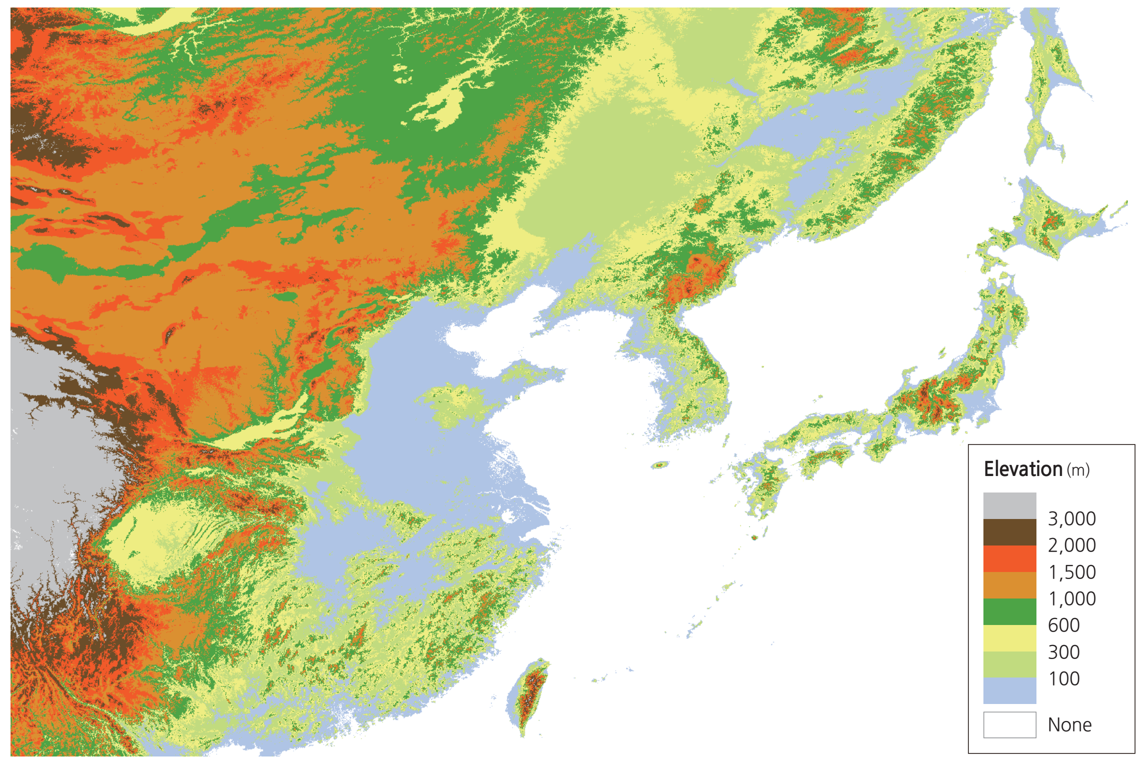
Topographic Relief and Profiles of the Korean Peninsula



National Geographic Information Institute (2018)

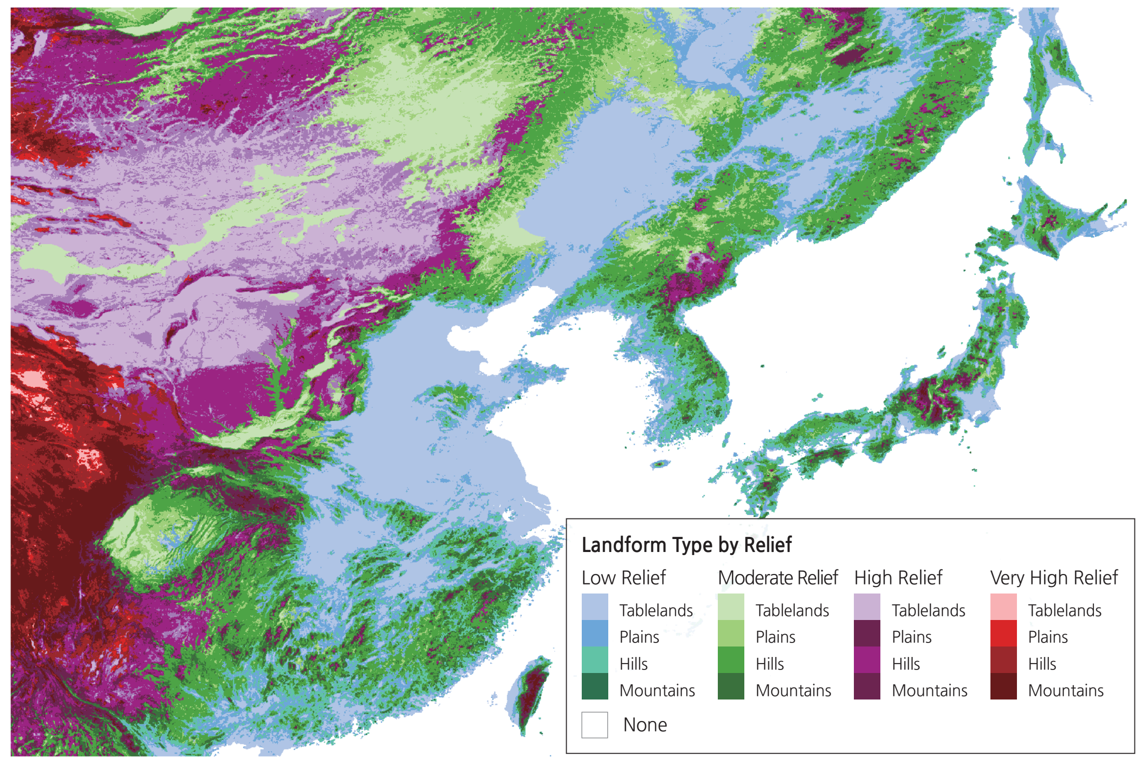
Landform Characteristics

Topographic Relief in East Asia



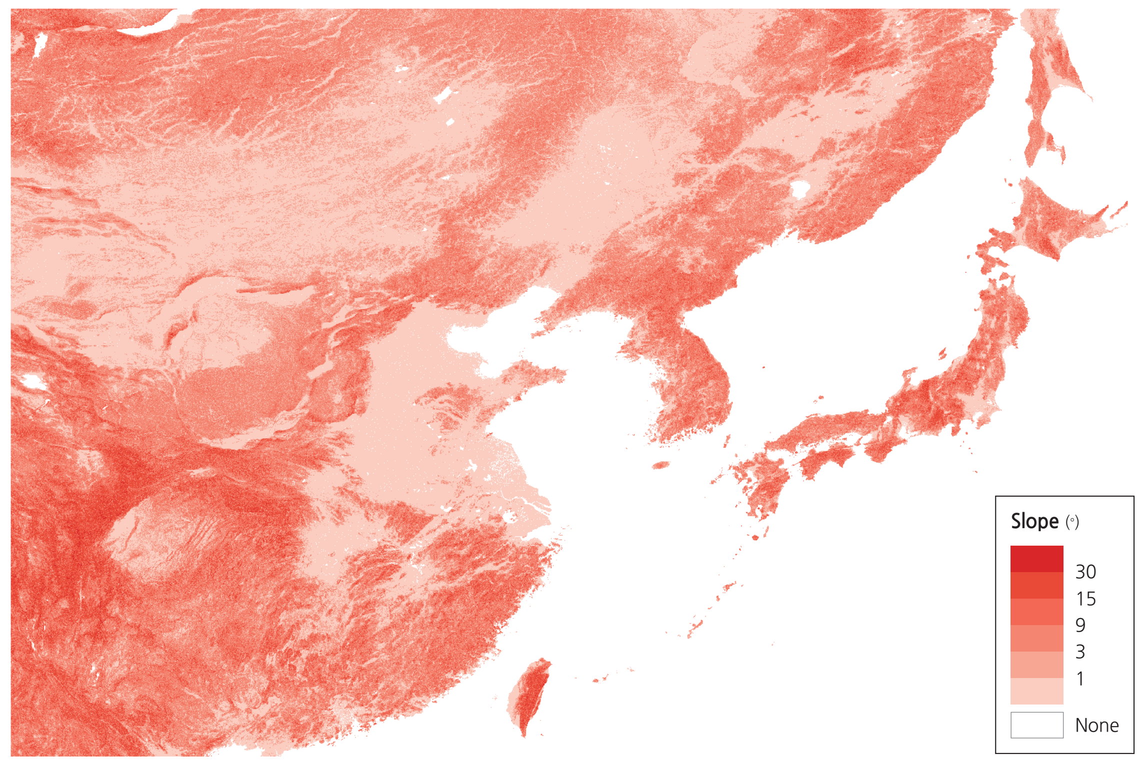
Korean Geographical Society (2019)

Classification of Landforms in East Asia



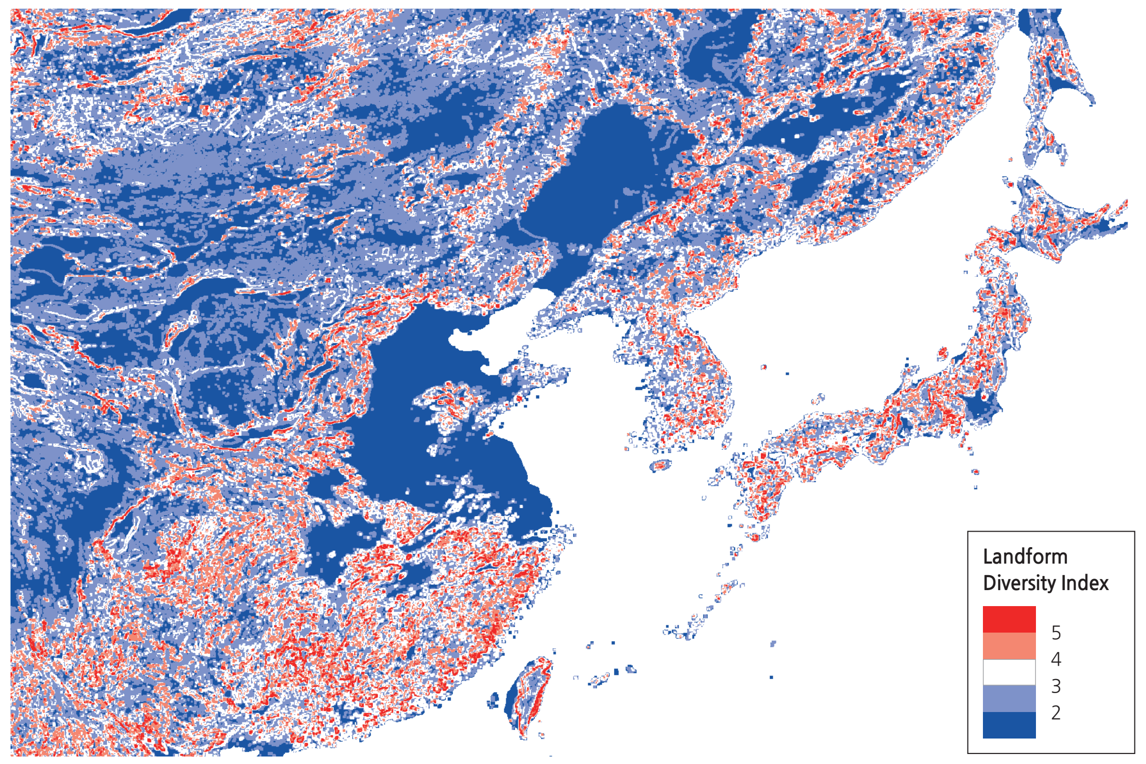
Korean Geographical Society (2019)

Topographic Slope in East Asia



Korean Geographical Society (2019)

Diversity of Landforms in East Asia



Korean Geographical Society (2019)

According to the Landform Classification, 77.5% of the Korean Peninsula is comprised of low-level mountainous areas (26.2%), medium-level mountainous areas (22.1%), low-level flatlands (18.5%), and medium-level mountain areas (10.7%). The Landform Diversity Index (the number of different landform units within a 100 km² area) for Korea displays an average of 2.78 with a standard deviation of 0.95. Compared to East Asia, which has an average of 2.27 with a standard deviation of 1.06, Korean landforms exhibit higher overall diversity but have less variation within certain areas.

When considering the topography of the Korean Peninsula, the Sikhote-Alin mountain range, Southern China south of the Yangtze River, and Japan, the average elevation in descending order is as follows: Sikhote-Alin (507.0 m), the Korean Peninsula (448.5 m), Japan (390.9 m), and Southern China (312.8 m). However, the average slopes of each area show a different order: Korea (5.7˚) has the highest average slope, followed by Japan (5.4˚), Sikhote-Alin (5.2˚), and Southern China (5.0˚). Landform diversity has yet another order, with Southern China (3.0) showing the highest value, followed by Japan (2.9), Korea (2.8), and Sikhote-Alin (2.6).

Overall, the Korean Peninsula has a high average elevation and average slope but has the least change in slope among the four areas. While Korea has more low-level mountainous areas, Japan and Southern China display a larger percentage of low-level flatlands and medium-level mountainous areas. Abrupt changes in slope are rare in Korea.

Although the geographic features of the Korean Peninsula follow the continental geological structural lines of NE-SW, they also exhibit a perpendicular NNW-SSE orientation. It is assumed that this characteristic resulted from the formation of the East Sea, which was heavily influenced by the geological structure of the continent. The Peninsula also has relatively steep mountainous areas and diverse landform features, even though it does not have high elevations. Another characteristic of Korean topography is that the boundaries between mountainous areas and sedimentary flatlands are rather unclear. This phenomenon can be explained by slow tectonic movement and relatively small sedimentary flatlands across the Peninsula.

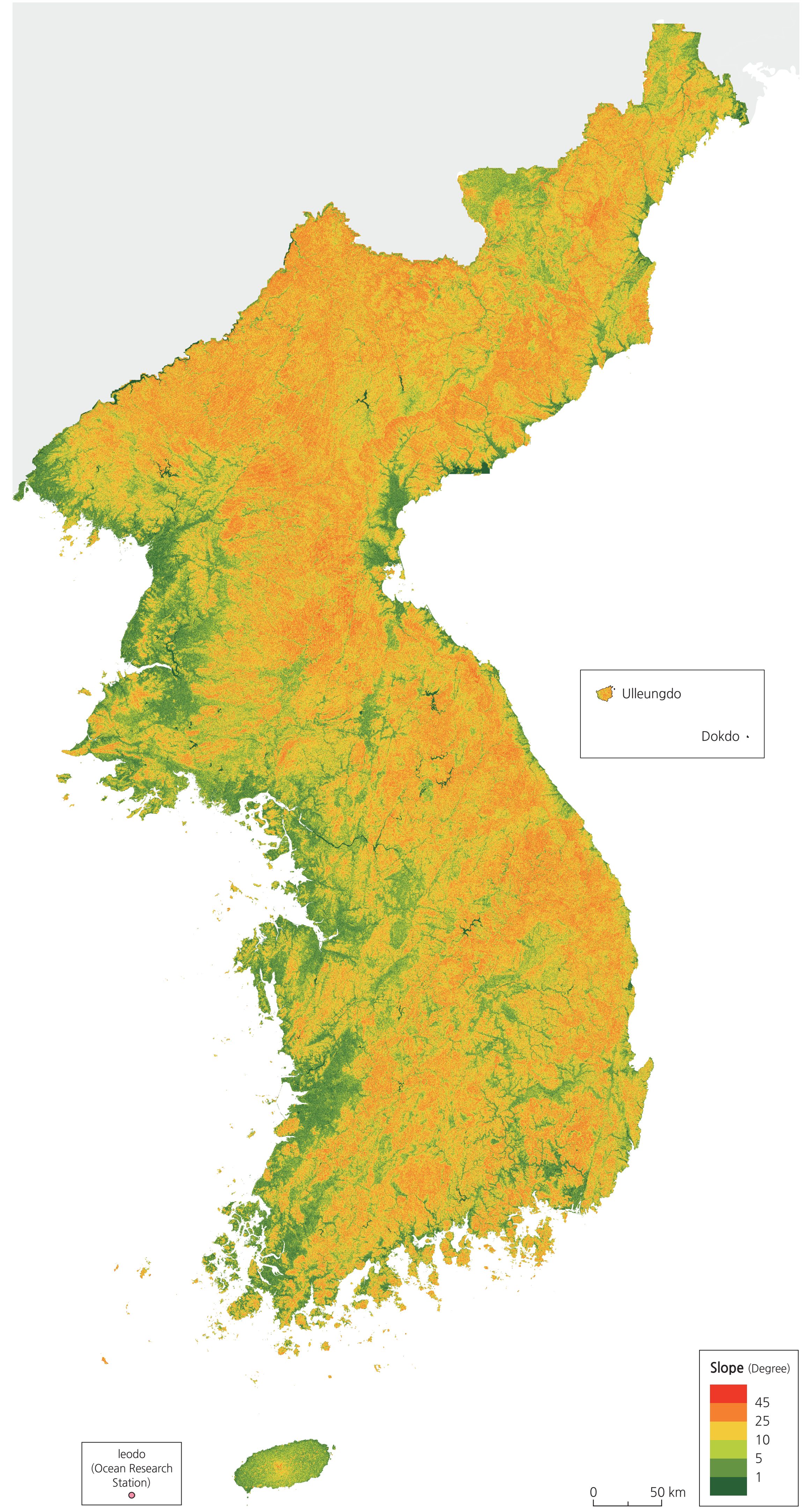
Average Elevation and Slope in Selected Regions in East Asia

Korean Geographical Society (2019)

Landform Diversity in Selected Regions in East Asia

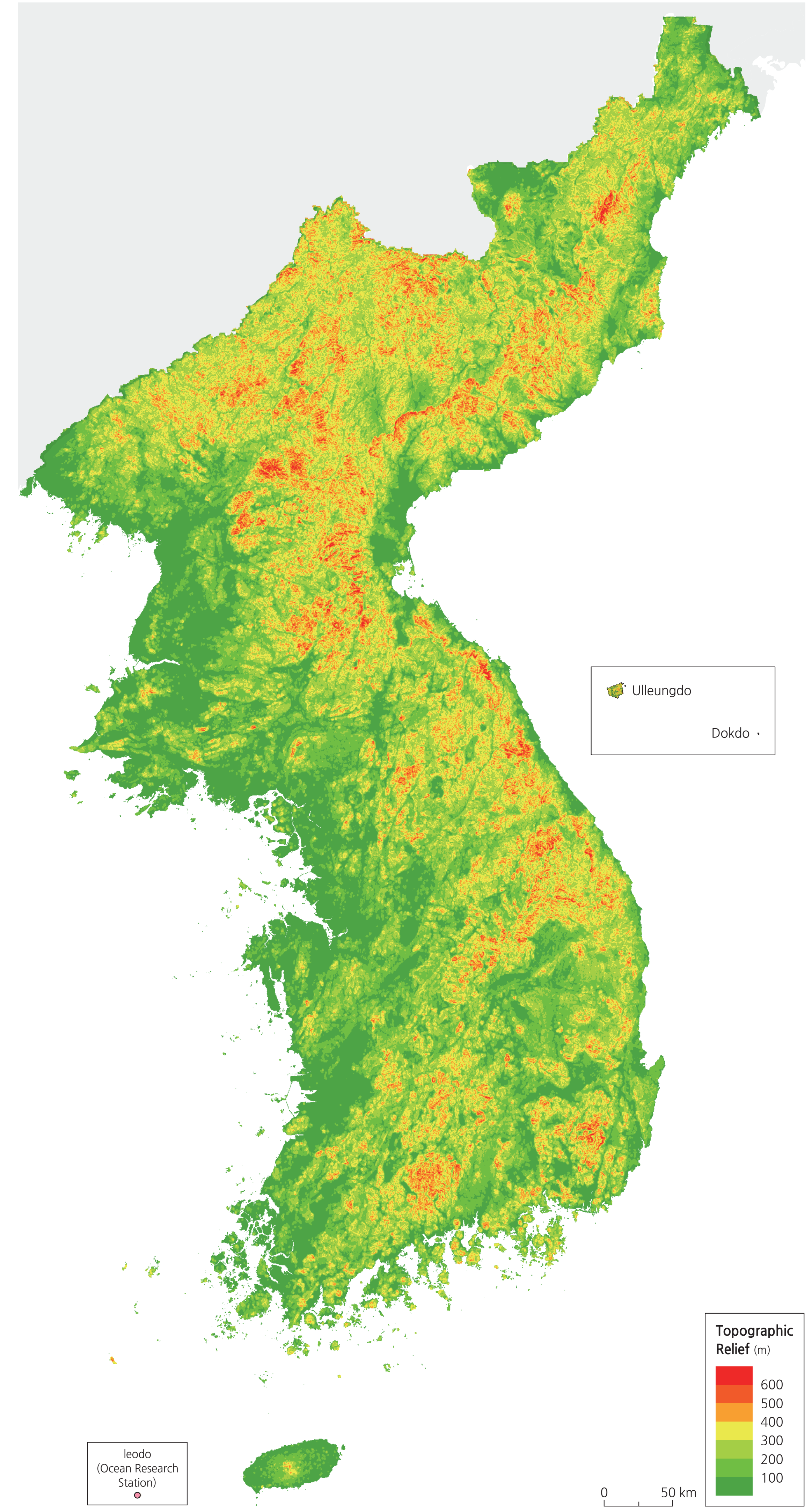
Korean Geographical Society (2019)

Topographic Slope



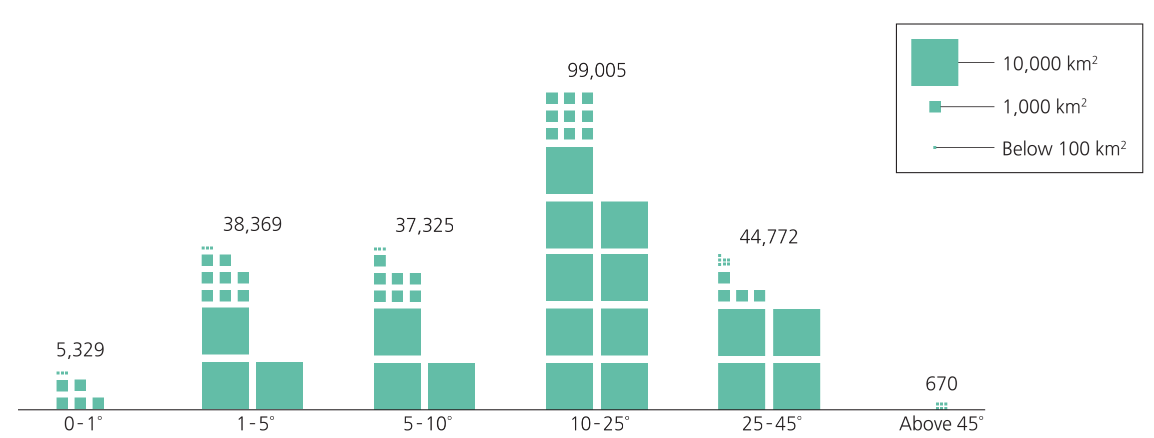
National Geographic Information Institute (2019)

Topographic Relief



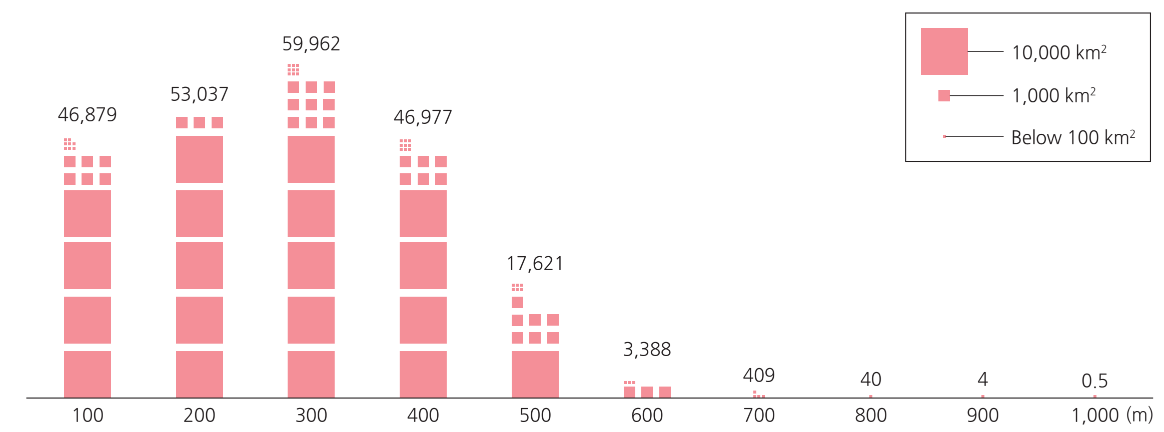
National Geographic Information Institute (2019)

Area by Slope



National Geographic Information Institute (2019)

Area by Topographic Relief



National Geographic Information Institute (2019)

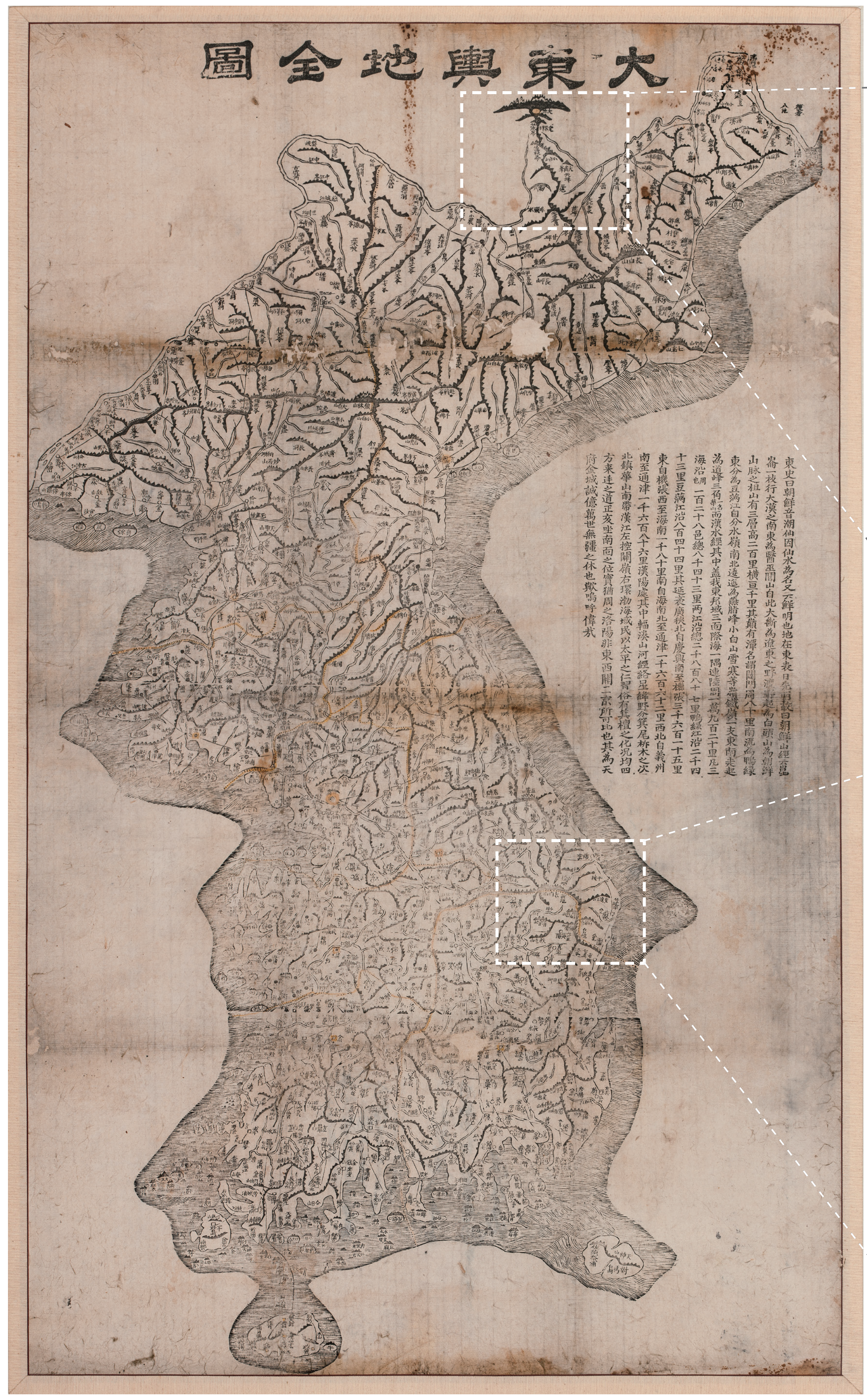
The elevation of the Korean Peninsula ranges between 0–2,744 m, with areas lower than 100 m accounting for 27.8% of the total land area. Fifty-two percent of the total land area is at an elevation below 300 m, while areas above 1,600 m only make up 5% of the total land area. Overall, as the elevation rises, the distribution area is reduced.

Low elevation areas (under 300 m) are located along the coastal and plains areas, whereas the mountainous regions of North and South Korea account for most of the 300–1,000 m elevation areas. Regions exceeding 1,500 m in height can be found near the Baekdusan-Gaemagowon region of North Korea, accompanied by some of the highest peaks of Taebaeksanmaek and Sobaeksanmaek. As for area distribution according to the slope, 36% of the land has gradients less than 10˚, 44% has gradients between 10–25˚, 20% has gradients between 25–45˚, and 0.3% has an inclination greater than 45˚. The majority of the gently sloping areas correspond to coastal regions. On average, the higher the elevation, the steeper the slope. However, the widely distributed lava plateau of the Baekdusan area is an exception; though the mountain's elevation is high, the slope is gradual until about 1800 m, where it becomes steep.

The local relief–calculated by subtracting the minimum elevation from maximum elevation within a 7 km radius–of the Korean Peninsula is between 0–968 m, with an average of 226 m. Most of the Peninsula (98%) demonstrates less than 500 m of relief. Regions with a relief of more than 500 m are distributed among the peaks of Hamgyeongsanmaek, Nangnimsanmaek, Taebaeksanmaek, and Sobaeksanmaek. When separated by 100 m relief intervals, 26% of the area consists of 200–300 m relief, representing the largest proportion of the area distribution; regions between 900–1,000 m relief account for less than 1%.

Changes in the Recognition of Landforms

Historical Map (*Daedong yeoji jeondo*, 大東輿地全圖)



Museum of Sungshin Women's University

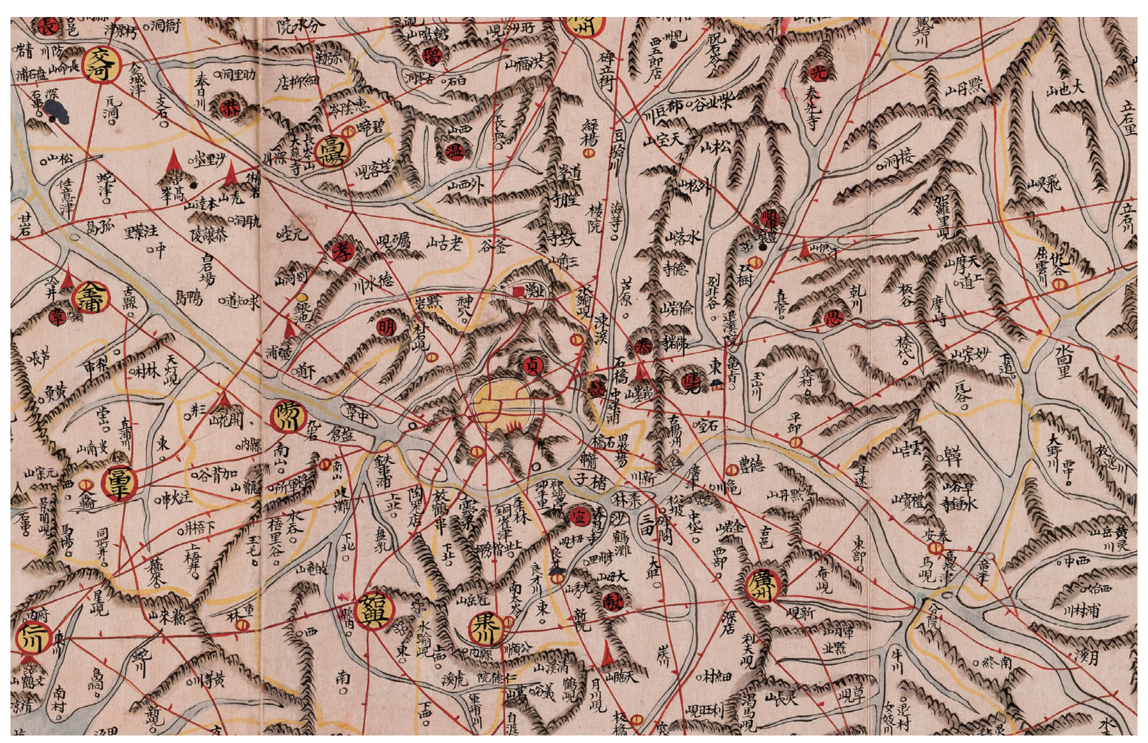
Daedong yeoji jeondo, housed in the Sungshin Women's University Museum, is a reduction from the original *Daedong yeojido* to a smaller scale (65 cm by 110 cm) by the great Korean cartographer Kim Jeongho in 1861 (Year 12 of King Cheoljong). Mountains are represented in this map using a chain-like feature–connecting mountain ranges with a line–similar to that used in *Daedong yeojido*. Famous mountains such as Baekdusan, Jangbaeksan, Geumgangsan, Nangnimsan, and Odaesan were indicated by highlighting the peaks with a rock shape. In addition, serrated crests were expressed in different thicknesses depending on the width and height of the crest topography, with major passes also marked on the map. The original *Daedong yeojido* (360 cm by 685 cm) covers an area spanning 19 longitudinal by 22 latitudinal lines carved on 121 woodblocks. It included 213 map pages when bound into a book.

The distribution pattern of the royal tombs of Joseon shown in *Dongyeodo* demonstrates the influence of Pungsu (Feng Shui) and Confucianism on their locations. These tombs are generally distributed from north to south along the mountain chains. Most of the tombs are located within 100 ri (about 40 km) from the royal palace, and the majority (26 tombs) are distributed within 8–16 km. Thirty-two royal tombs of the Joseon Dynasty are concentrated in the northeast and northwest zones of the capital city (*Hanyang*), and only seven are located to the south of Hangang. The tombs are meticulously designed according to *Pungsu* principles. Royal tombs are predominantly south-facing, followed by east-facing. Over 70% of royal tombs have a southerly orientation, including south, south-east, south-south-west, south-east, and south-west. Some royal tombs are oriented northeast and northwest. Most tombs are located in banded gneiss and granite with thick topsoil.

Hanseongbu in *Daedong yeojido*

Kyujanggak Institute for Korean Studies, Seoul National University

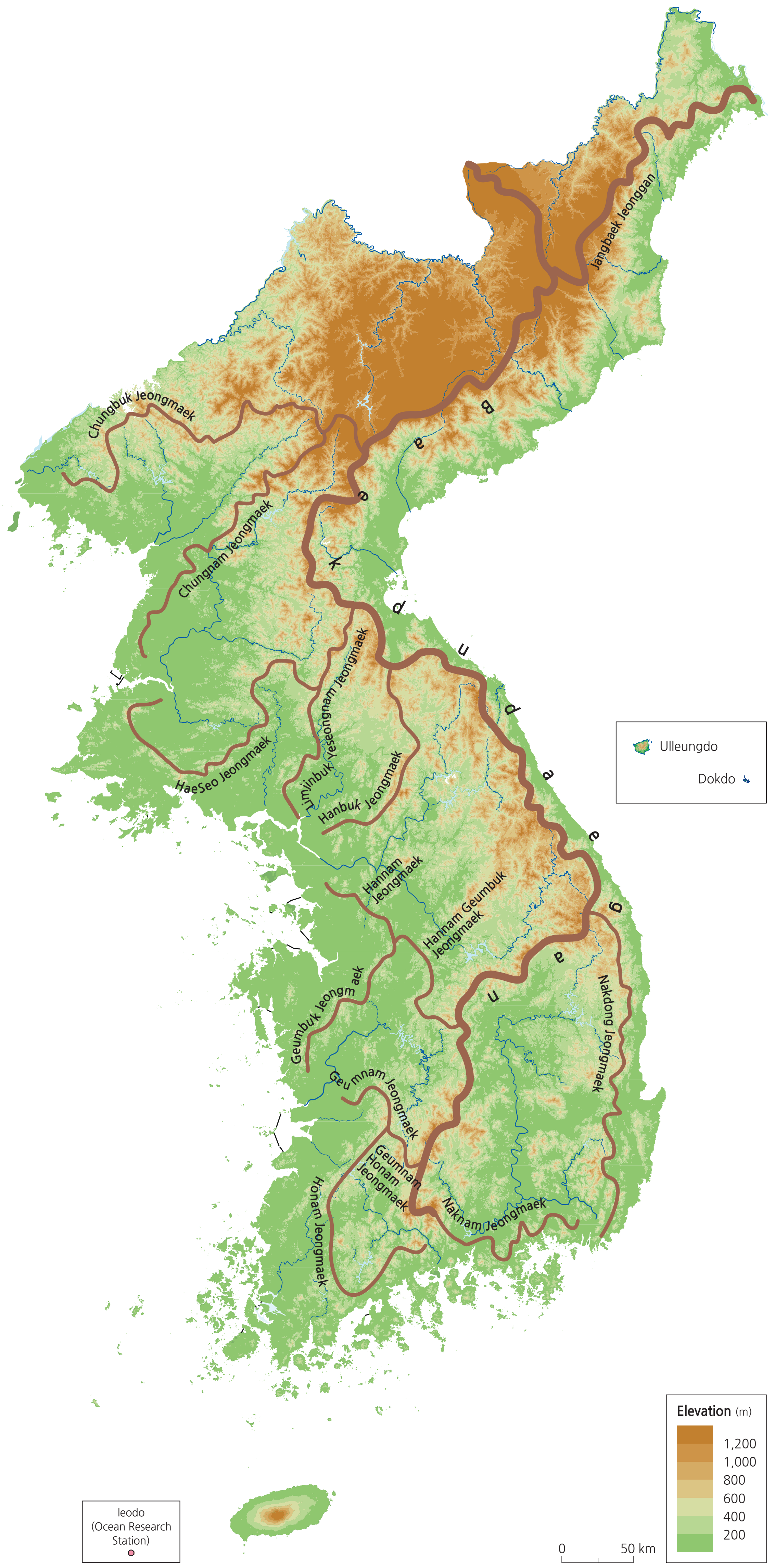
Distribution of Royal Tombs (Part of *Dongyeodo*)



* Red circles indicate the location of the royal tombs.

Kyujanggak Institute for Korean Studies, Seoul National University

Mountain Chains (*Daegan and Jeongmaek*)



Korea Forest Service (2015)

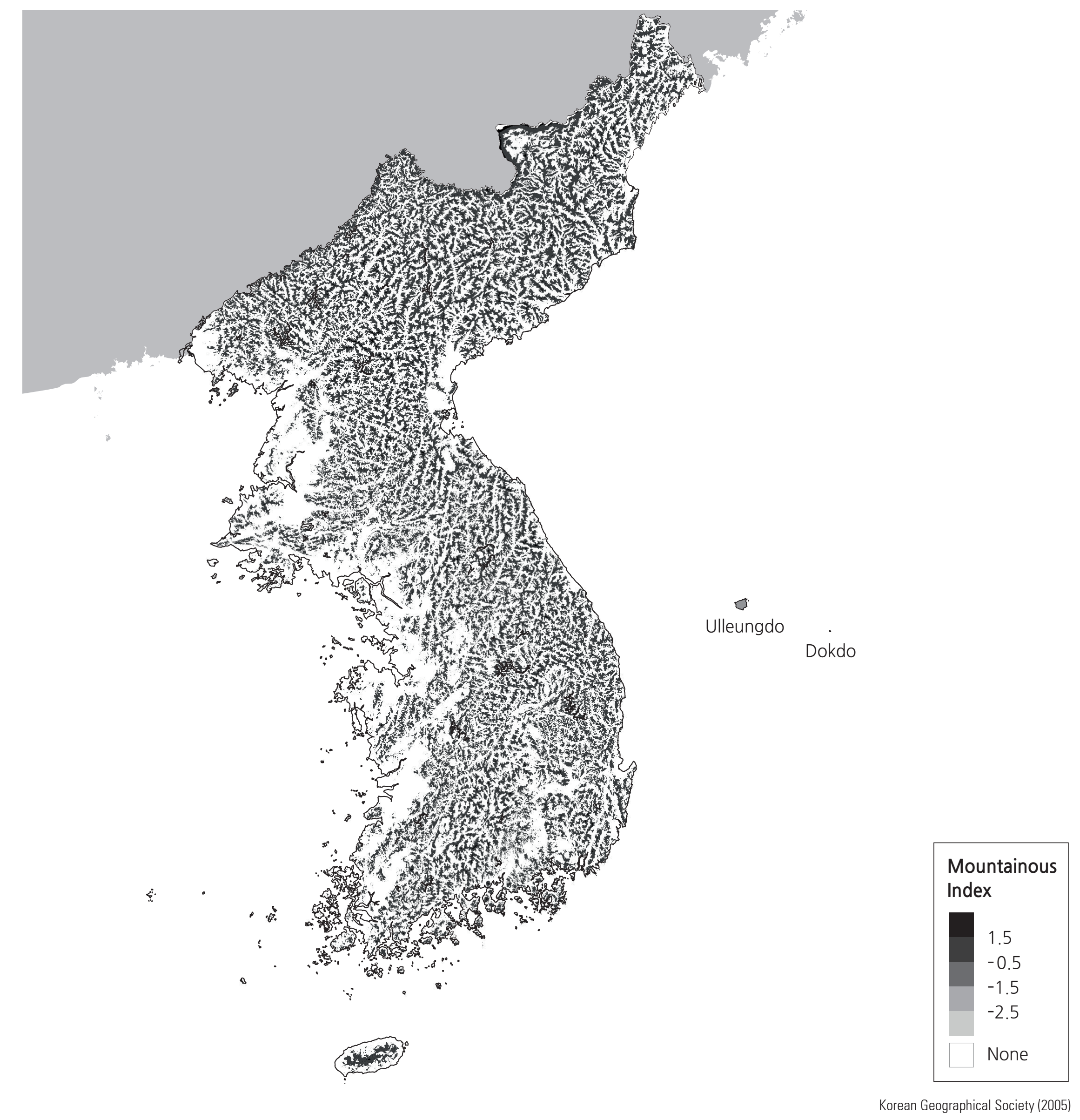
Making up a large proportion of the Korean Peninsula, mountainous regions and their complex distributions are mapped in multiple ways. Three main methods are currently being used to represent mountain distribution: the mountain ridge map, the mountain range map, and the mountain chain map.

The traditional geographical thought of Korea is portrayed in mountain ridge maps, which use lines to express the intertwined relationship of major mountains. A representative mountain ridge map is the *Baekdudaegan* map, which was published in *Sangyeongpyo*. The map illustrates 1 *Daegan*, 1 *Jeonggan*, and 13 *Jeongmaek*.

Mountain ridge maps help us visualize the geographical unity of the Korean Peninsula by emphasizing that mountain systems are interconnected just as rivers are continuous. These maps specifically demarcate high peaks and mountain ridges, recognizing their importance as connecting passageways between living spheres and ridges. Even without modern scientific explanations of geological structures, terrain formation, and landscape changes, traditional geography emphasized watershed systems to differentiate human settlement areas. By connecting the mountain ridge of Baekdusan and Jirisan, the *Baekdudaegan* map provides a sense of unity and order throughout the Peninsula and helps secure the national symbolism of Baekdusan. The full uninterrupted illustration of the watershed further helps to identify rivers and mountain ridges more easily.

The mountain ridge system of Baekdudaegan, proposed by Shin Kyeongjoon, resembles the watershed dividing lines of the ten main river basins in Korea and reflects the connectivity of the mountains. Understanding mountains based on river basins is a unique way of geographically visualizing indigenous nature in Korea. The mountain ridge map enhances the understanding of the natural environment and the distribution of villages.

Mountainous Index

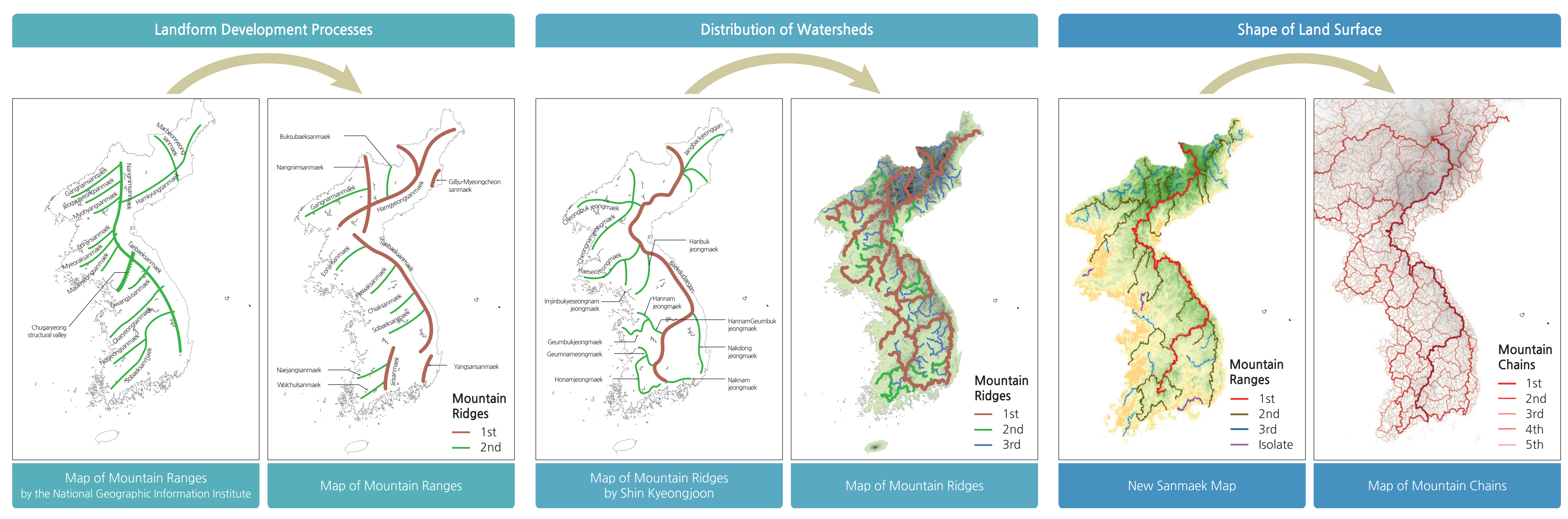


Korean Geographical Society (2005)

Mountain range maps classify mountains based on the premise that mountain ranges display characteristics of the nation's geological history and tectonic movements. Lastly, mountain chain maps depict the prominence and connectivity of mountains to their neighboring mountains.

In summary, traditional Korean geography is beneficial for the efficient development and usage of the mountainous terrain and understanding Korean geomorphological features through the lens of Pungsu.

Various Perspectives of Mountain Ranges in the Korean Peninsula



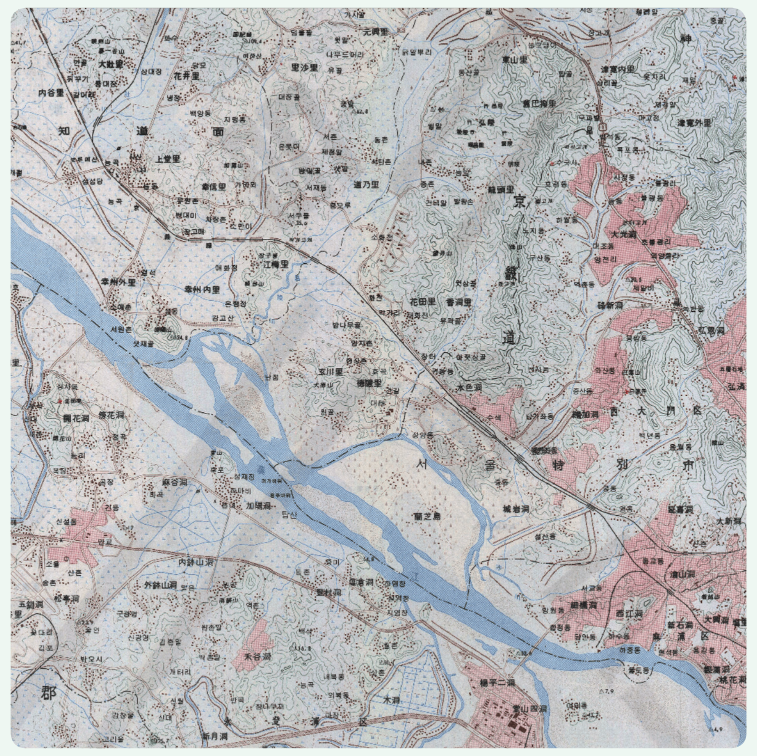
National Geographic Information Institute (1982) | Korean Geographical Society (2007) | Lee Woohyeong (1993) | Korean Geographical Society (2005) | Korea Research Institute for Human Settlements (2004) | Korea Forest Service (2016)

History of Topographic Mapmaking

Topographic Map (1919)

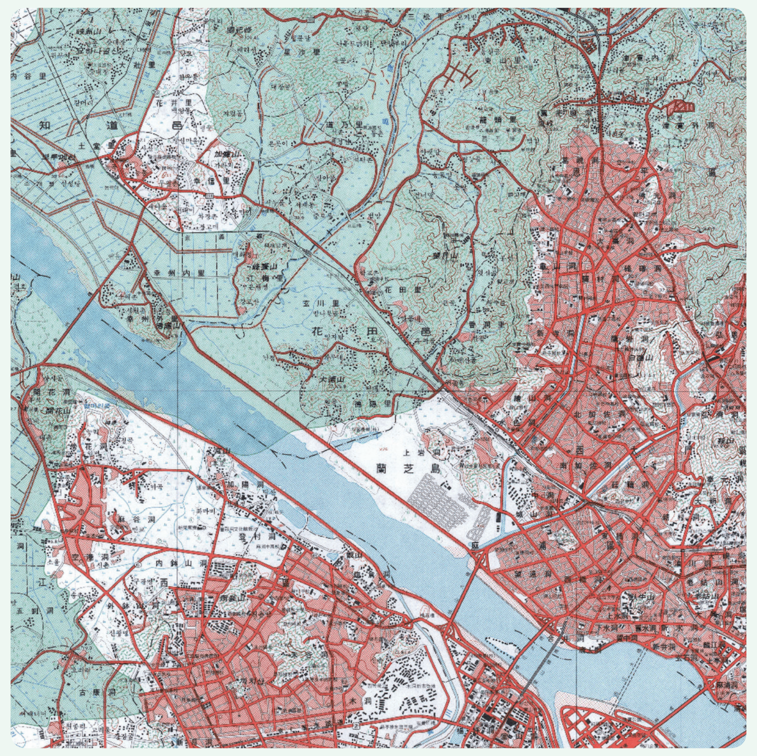
National Geographic Information Institute

Topographic Map (1969)



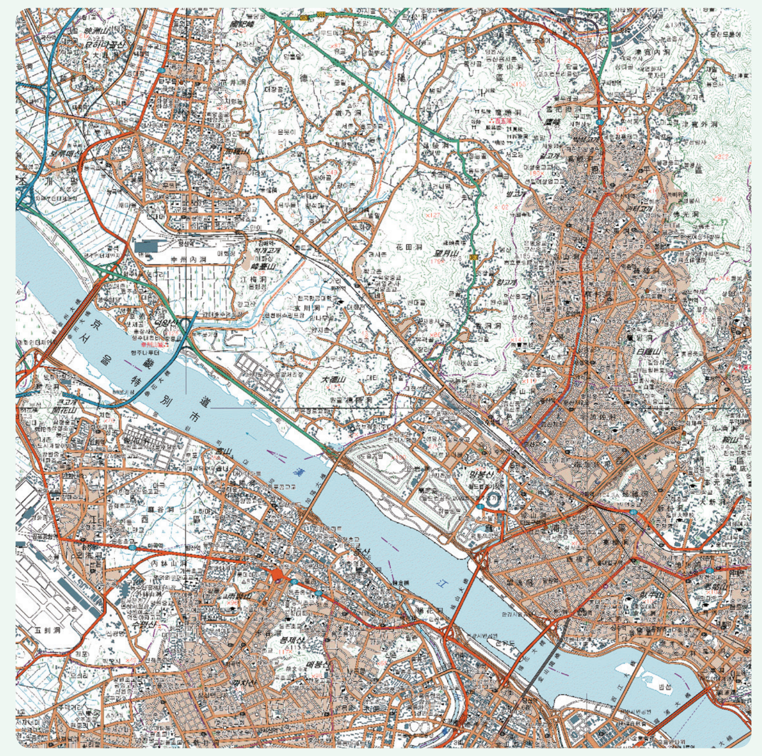
National Geographic Information Institute

Topographic Map (1990)



National Geographic Information Institute

Topographic Map (2007)



National Geographic Information Institute

Digital Topographic Map (2015)

National Geographic Information Institute

Image taken by Arirang Satellite (2015)

Korea Aerospace Research Institute

History of Korean Satellite Development

Name of Satellite	Launch Date (yyyy.mm.dd)	Properties and Missions	Owners
Wooribyeol 1	1992. 08. 11	First Korean satellite/Technology development, scientific development, education, capacity building	Government
Wooribyeol 2	1993. 09. 26	First Korean satellite built with domestically-produced parts/space and earth observation, fundamental communication technology development	Government
Mugunghwa 1	1995. 08. 05	First Korean broadcasting and communication satellite/Broadcasting business for Korea Telecom	Private
Mugunghwa 2	1996. 01. 14	Commercial broadband broadcasting and communication satellite	Private
Wooribyeol 3	1999. 05. 26	First domestically designed satellite/Universe and earth observation	Government
Mugunghwa 3	1999. 09. 05	Commercial broadcasting and communication satellite	Private
Arirang 1	1999. 12. 21	First multi-purposed satellite with digital camera on board/Mapping terrestrial areas, oceanographic observation	Government
Wooribyeol 4	2003. 09. 27	First Korean low-orbit micro satellite/Universe observation and universe life searching	Government
Hanbyeol 1	2004. 03. 13	Digital media service satellite/Digital Multimedia Broadcasting (DMB)	Private
Arirang 2	2006. 07. 28	Low-orbit satellite with 1-meter spatial resolution/Monitoring natural disasters, mapping land use and resources, basic source for Geographic Information System	Government
Mugunghwa 5	2006. 08. 22	Commercial satellite/Private and military purposes	Private
Chollian 1	2010. 06. 27	First Korean geostationary satellite/Communications, meteorological observation, ocean observation	Government
Alleh 1 (Mugunghwa 6)	2010. 12. 30	High definition TV and 3D Broadcasting	Private
Arirang 3	2012. 05. 18	Multi-purpose satellite equipped with a sub-meter resolution camera/Observation of environment, oceanography, meteorology, geology, forestry, water resources, other	Government
Wooribyeol 5	2013. 01. 30	Satellite developed with domestic research technology/Solar storm observation, laser communication	Government
Ariang 5	2013. 08. 22	Multi-purpose satellite with sub-meter resolution camera and SAR sensor/Weather-independent observation	Government
Scientific Technological Satellite 3	2013. 11. 21	Scientific and technological satellite with IR camera and small scanning imager/Scientific research, atmosphere observation, forest fire detection	Government
Arirang 3A	2015. 03. 26	Satellite equipped with 0.5 m resolution camera and IR sensor/precision observation on the earth	Government
Chollian 2A	2018. 11. 28	Enhanced spatial resolution and observation cycle/Weather observation on the earth and space	Government
Chollian 2B	2020. 02. 19	Geostationary orbit satellite capable of atmosphere observation in geostationary orbit/ocean and environment observation	Government

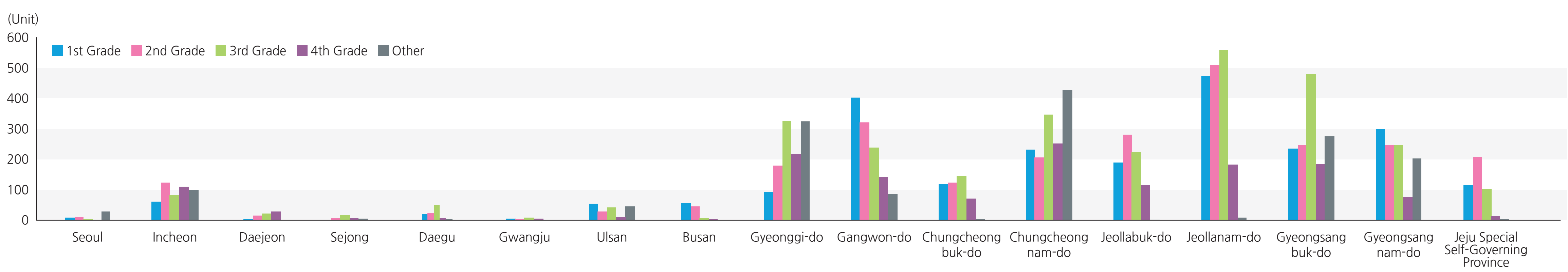
Korea Aerospace Research Institute (2020)

In the late Joseon Dynasty, modern topographic maps were introduced into the nation and coexisted with traditional maps. Modern mapmaking can be traced to the Korean Empire Period with the publication of *Daehan jeondo* in 1899. This map was the nation's first attempt to utilize latitude and longitude as its coordinate system. Efforts to make cadastral maps and topographic maps based on land surveys in 1909 were thwarted by the Japanese occupation. From 1914, the Japanese Governor-General of Korea made 722 1:50,000 scale topographic maps of the whole Korean territory and 143 1:25,000 scale topographic maps of major urban regions for land exploitation and military purposes.

After independence, the democratic Korean government was formally established in August 1948, and the surveying troops from the Korean Army Headquarters were in charge of mapping. In 1958, the Ministry of National Defense established the National Geographic Research Institute, the first formal mapmaking governmental organization. From 1961 to 1963, the institute converted and revised 350 military topographic maps (1:50,000 scale) covering South Korea and made them available to the public.

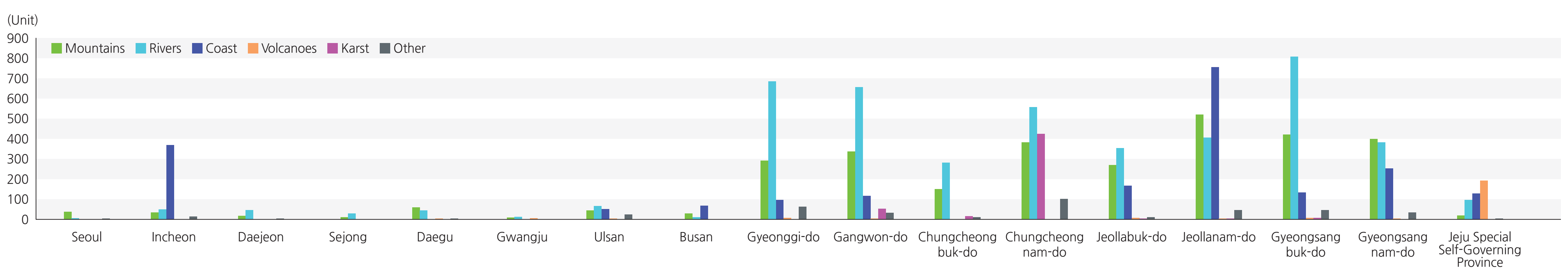
Experiencing fast economic growth and increased demand for maps, the Korean government tried to develop a Cooperative Survey Program between Korea and the Netherlands to meet the request for precise topographic maps on a large scale. From 1967 to 1974, most parts of South Korea were mapped at a scale of 1:25,000 to produce 765 new maps. The National Geographic Information Institute was established under the Ministry of Construction in 1974, and has since consecutively produced 1:5,000 scale topographic maps and 1:250,000 scale thematic maps that include coastal base maps, land use maps, artificial satellite imagery maps, and aerial photo maps.

Topographic Grade Distribution by Administrative Districts



National Institute of Ecology (2020)

Composition of Terrain by Administrative Districts



National Institute of Ecology (2020)

Automated map production was first introduced in the mid-1980s. Using data from the National Geographic Information System (NGIS), digital topographic maps at scales of 1:1,000, 1:5,000, and 1:25,000 were being produced by the late 1990s. Since 2001, the maps have been continuously updated and revised. By 2003, the second set of digital maps (topographic maps 2.0) was completed, and the fully automated production process of maps at a scale of 1:5,000 fueled its commercialization. New mapping technologies are now being developed with the Mobile Mapping System (MMS), aerial photography, and construction drawings.

Satellite imagery is utilized for a wide range of applications, such as monitoring potential natural disasters and analyzing resource use. Information collected from satellite images serves as basic data for geographic information systems and ultimately contributes to balanced national development.

Korea began its Space Development Plan at the end of the 1980s to promote cutting-edge technology. Based on the master plan for long-term national space industry development, various initiatives were launched in the 1990s, including the development of artificial satellites. The first artificial satellite, KITSAT-1, was launched on August 11, 1992, successfully drawing public attention and support for the national space industry. Many fields have benefited from artificial satellites; broadcasting and communications services, marine observation, natural disaster prediction, and weather forecasting are just some of a continuously expanding range.

Korea created its third long-term plan for national space development and expects to launch twenty more satellites. It strives to further develop space technology and forge international partnerships to participate in the space station project. Korea aims to become a front-runner in the global space industry within the next ten years.

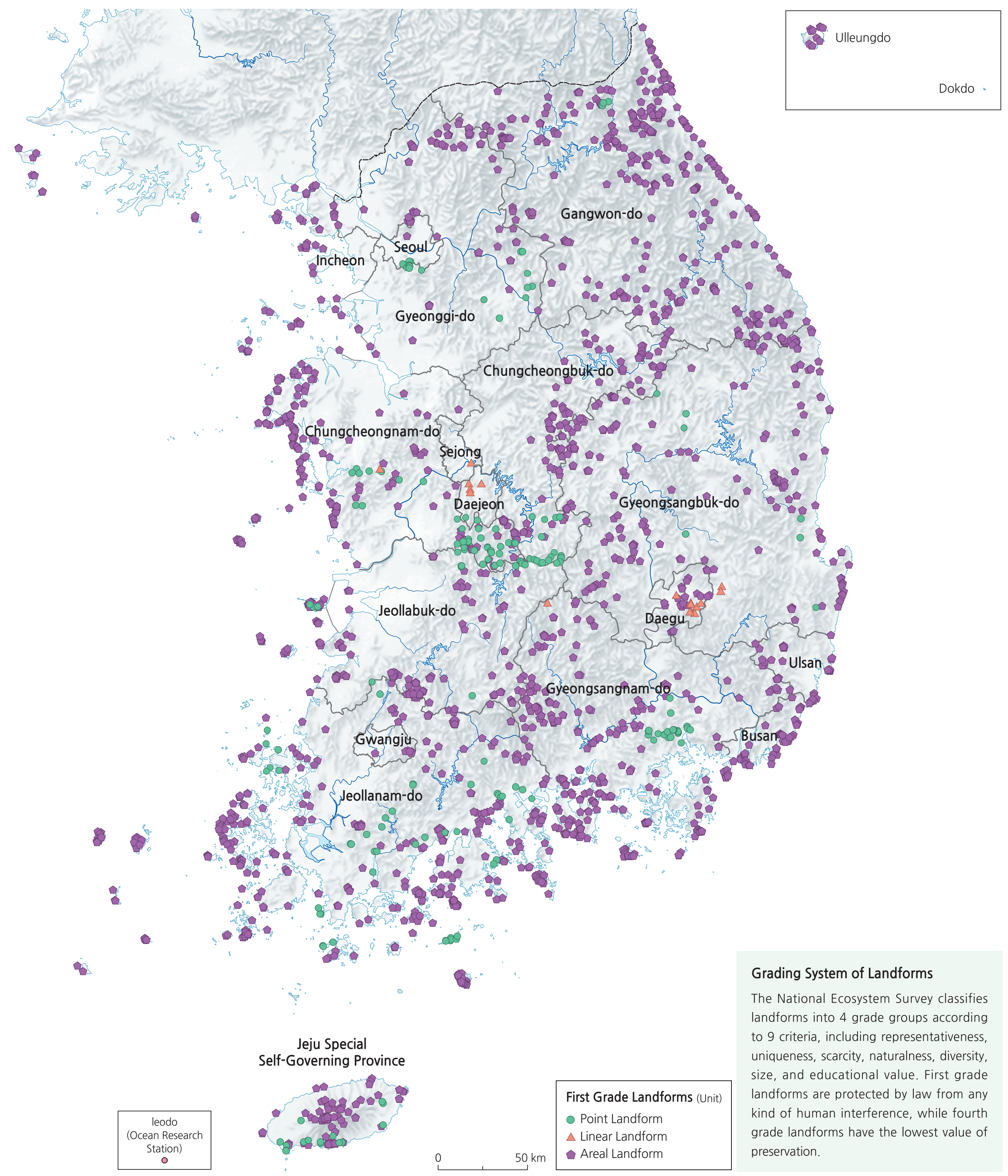
Korea conducts a national ecosystem survey that inspects the comprehensive status of the natural environment. It covers abiotic components (topography, geology, land, and soil) and biotic components (plants and animals). This survey enhances the understanding of topological features, the distribution of plant and animal species, the level of environmental destruction, conservational value, and more by analyzing the characteristics of each element.

The national ecosystem survey has three components: first, a comprehensive national environment survey as a basic investigation of the natural environment; second, a targeted survey of key ecological landscapes that include inland wetlands, uninhabited islands, coastal sand dunes, estuaries, and other landscapes of outstanding ecological importance; and lastly, a species survey on legally protected, rare, and endangered wild flora and fauna.

This survey is the largest of its kind conducted annually in Korea, involving around 500 researchers in various fields, including landforms and taxonomic groups of plant and animal species. The nation's first survey (1986 to 1990) covered terrestrial, freshwater, and coastal ecosystems and was based on the "Basic Plan for the National Ecosystem Survey (1986)." The landform survey was included in the second-phase survey (1997 to 2003) and has been continuously updated. The fifth survey began in 2019.

Geomorphological and landscape features are some of the most fundamental components of the natural ecosystem. Topographic features directly influence surface geology, soil distribution, groundwater status, and growth and reproduction of plant and animal species. The national landform survey comprises two different surveys: one is a general survey of features such as mountains, river landforms, and coastal landforms; the other is a special survey of volcanic and karst landforms. The results of the topographic survey are categorized into points, lines, and polygons based on their attributes. The fourth phase survey has reported that valuable topographic features of the first grade comprise 191 points, 19 lines, and 2,170 polygons in Korea.

First Grade Landforms by National Ecosystem Survey



Grading System of Landforms

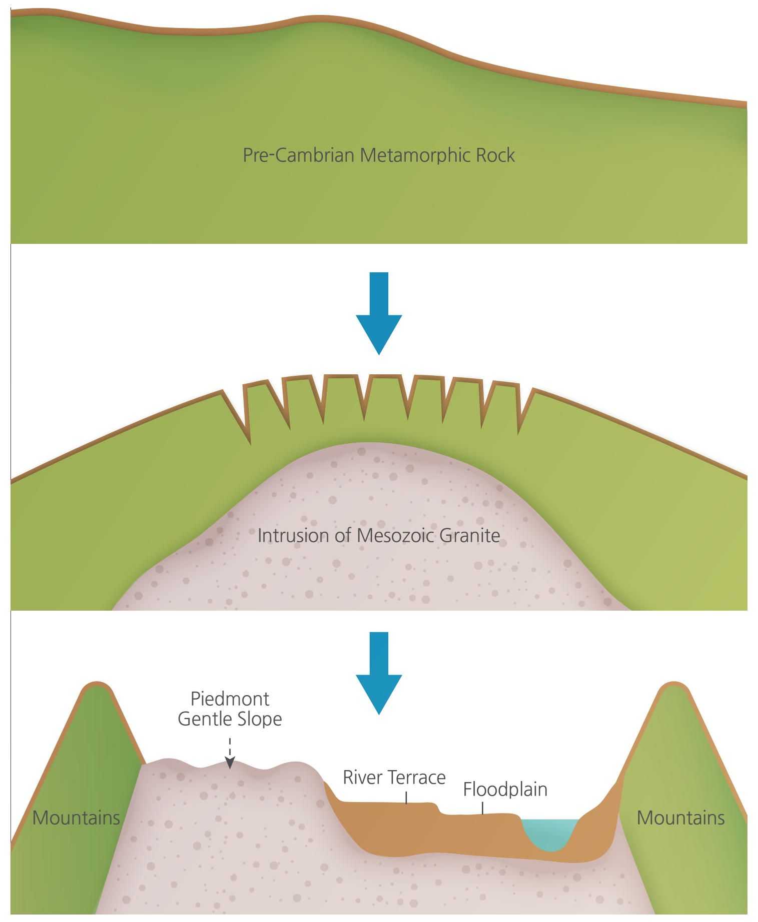
The National Ecosystem Survey classifies landforms into 4 grade groups according to 9 criteria, including representativeness, uniqueness, scarcity, naturalness, diversity, size, and educational value. First grade landforms are protected by law from any kind of human interference, while fourth grade landforms have the lowest value of preservation.

National Institute of Ecology (2020)

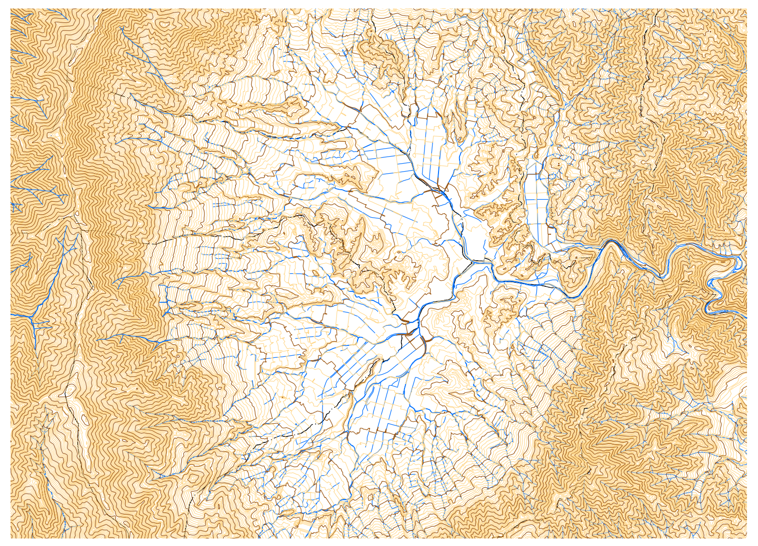
The data collected through the national ecosystem survey enhances our understanding of the landscape and is foundational to understanding the natural resource potential and the distribution of biodiversity. Experts such as environmental managers, development planners, and government officials may utilize the comprehensive overview of the survey as it is incorporated into ecological maps to understand the distribution of biological diversity, establish development plans, carry out environmental impact evaluations, and conduct natural environment assessments.

Geomorphological Landscapes

Formation of Erosional Basins



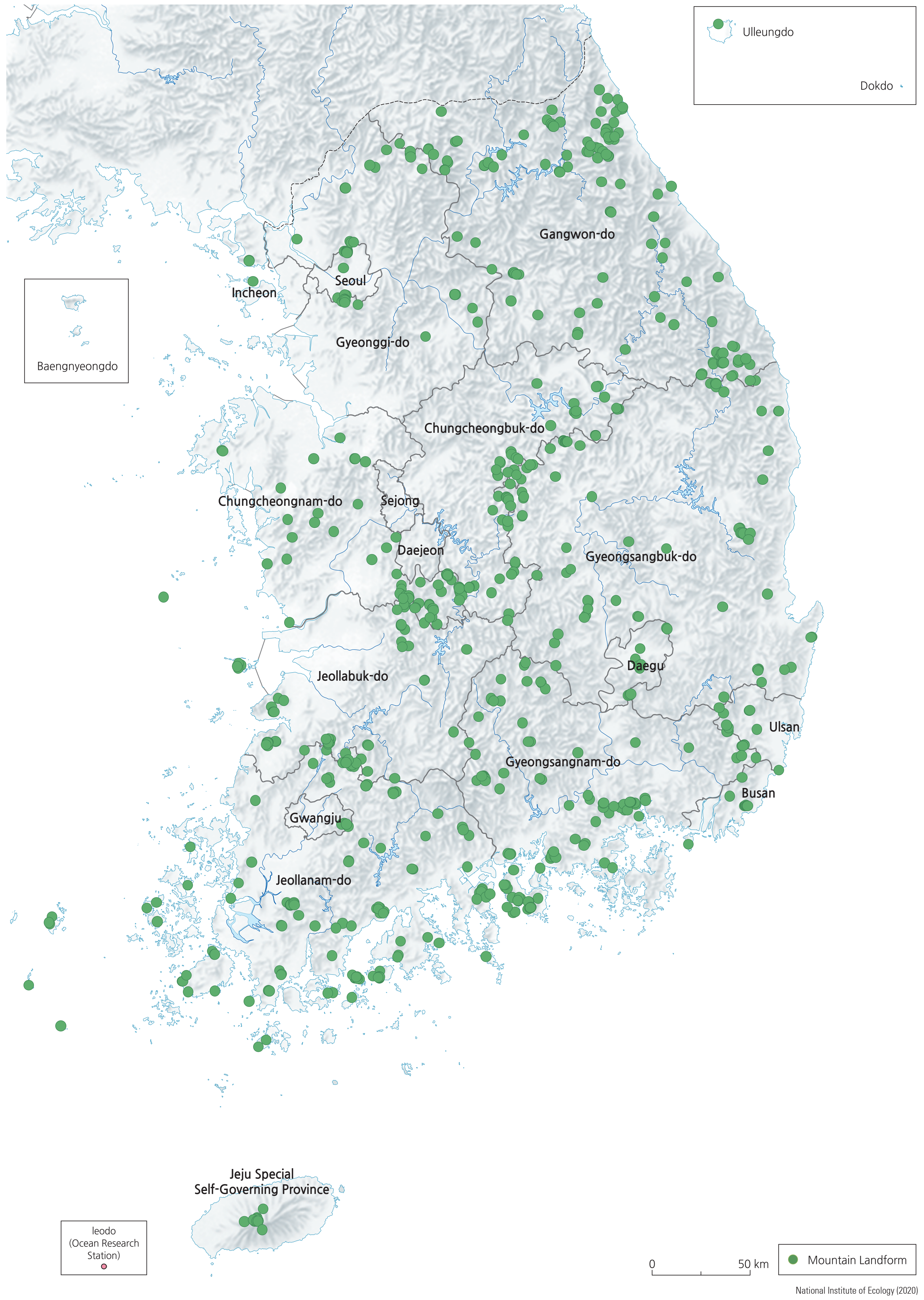
Example of Erosional Basin (Haean Basin)



National Geographic Information Institute (2015)

Erosional Basin (Haean Basin in Yanggu, Gangwon-do)

First Grade Mountain Landforms



National Institute of Ecology (2020)

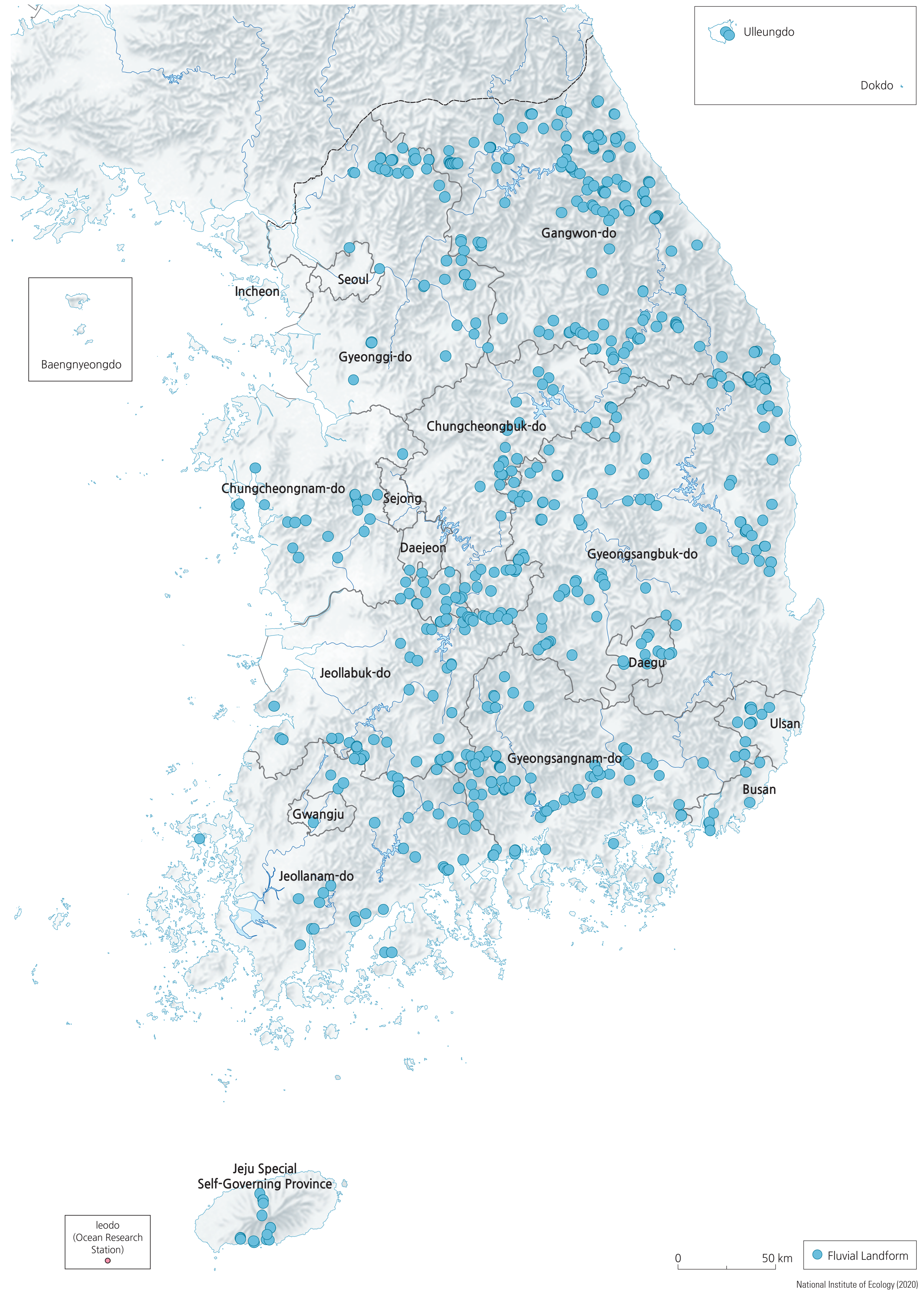
Tafoni (Maisan, Jinan, Jeollabuk-do)

Granite Dome (Bukhansan, Seoul)

Block Field (Seoraksan, Inje, Gangwon-do)

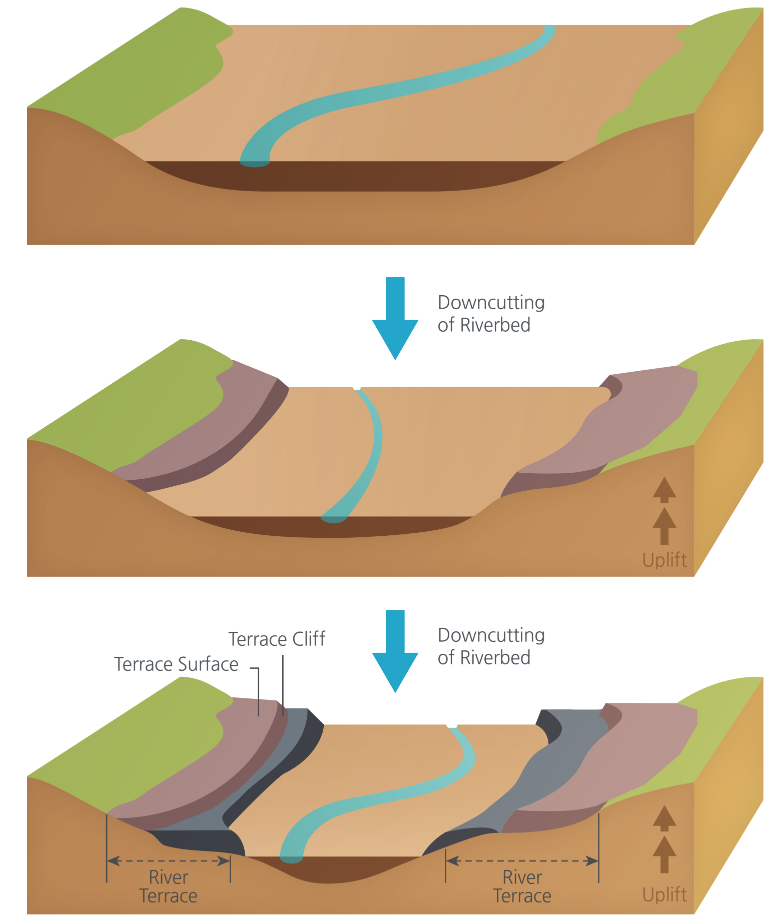
Although approximately 70% of Korea's territory consists of mountainous areas, there are not many mountains with high elevations. The highest peak in South Korea (excluding Hallasan in Jejudo) is Jirisan, which stands less than 2,000 m. The higher mountains are distributed toward the eastern side, a phenomenon that can be explained by the asymmetrical warping of the Korean Peninsula. Bedrock that is resistant to weathering and erosion constitutes the high rugged mountains, while less resistant rocks characterize the lowlands, basins, and valleys. South Korea displays a complex topographic regime due to various bedrock compositions formed over different geological periods. For example, metamorphic rocks originate from the Pre-Cambrian, granite and volcanic rocks were formed during the Mesozoic, and sediments remain from the Tertiary and Quaternary. Typical eroded and weathered landforms include erosional basins, sinuous rivers, rock cliffs, rock domes, tors, tafoni, and caves, while depositional landforms include block streams, talus deposits, and upland wetlands. According to the Natural Ecosystem Survey, first-grade landforms are generally located along the high mountains of Taebaeksanmaek and Sobaeksanmaek and are also widely distributed in island areas.

First Grade Fluvial Landforms

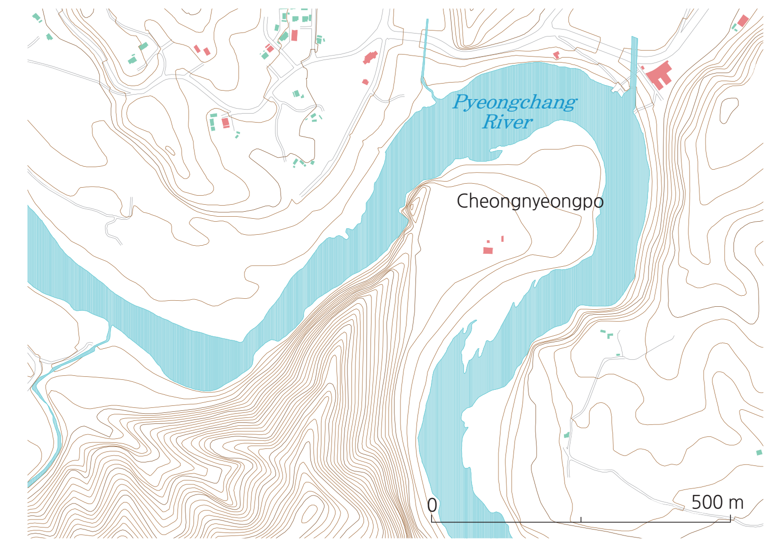


National Institute of Ecology (2020)

Formation of River Terrace



Example of Fluvial Landforms



National Geographic Information Institute (2015)

Entrenched Meander (Yeongwol, Gangwon-do)

Riverine Wetland (Yeongwol, Gangwon-do)

Waterfall (Seoraksan, Inje, Gangwon-do)

Riverside Cliff (Yeongyang, Gyeongsangbuk-do)

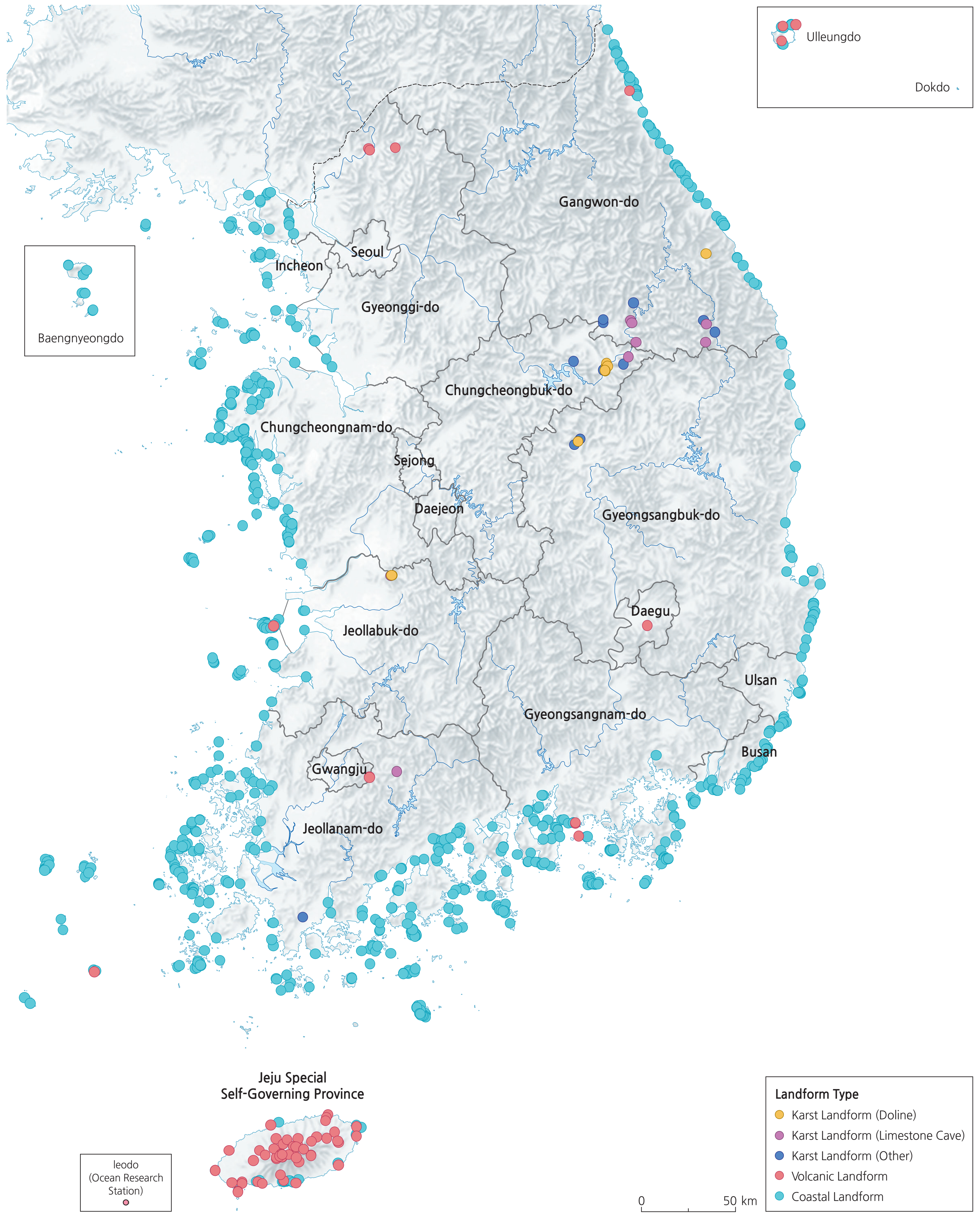
Rivers in Korea can be classified as straight, meandering, or braided. Straight rivers are bounded by exposed bedrock between narrow valleys and mounds, and meandering rivers develop on wide floodplains. Typical erosional landforms include waterfalls, potholes, riverine cliffs, and riverine caves, while typical depositional landforms include deltas, alluvial fans, riverbanks, point bars, and riverine wetlands. The floodplains formed by Hangang, Nakdonggang, and Geumgang constitute major agricultural plains in South Korea. The natural levees and backswamps of these floodplains developed from the last glacial period; eroded valleys were filled with sediments due to rising sea levels. Deltas, which are an extension of floodplains, are shaped by sediment discharge of rivers, ocean tides, and waves. They are generally located where the mouth of a river on the floodplain meets the sea. Nakdonggang Delta is a representative example. Alluvial fans are formed from small rivers and are mainly used for agriculture. Most eroded stream topography is observed in upstream areas of large rivers or around smaller rivers. In Korea, many of these regions have become tourist destinations as the exposure of bedrock creates a unique landscape. As a result, the most notable examples of river topography within the nation are generally located in upstream regions, rather than near the mouth of a river.

Tideland (Gomsoman, Gochang, Jeollabuk-do)

Sea Stack (Yokjido, Tongyeong, Gyeongsangnam-do)

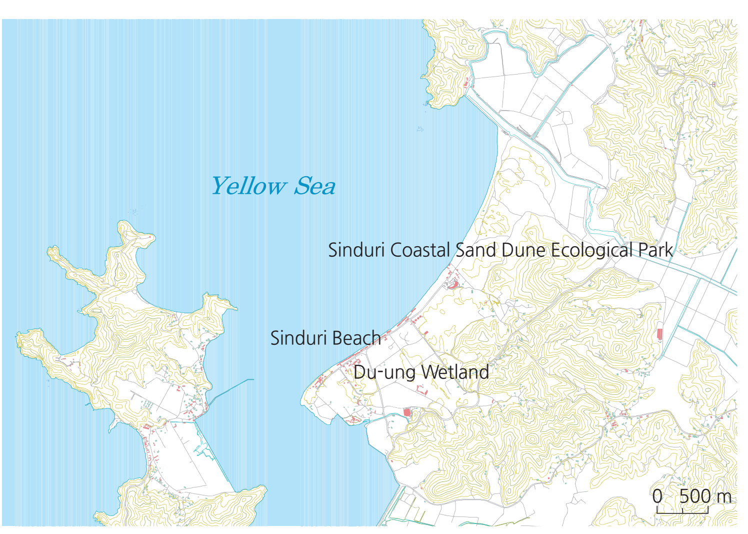
Coastal Sand Dune (Sinduri, Taean, Chungcheongnam-do)

First Grade Coastal Landforms, Volcanic Landforms, and Karsts



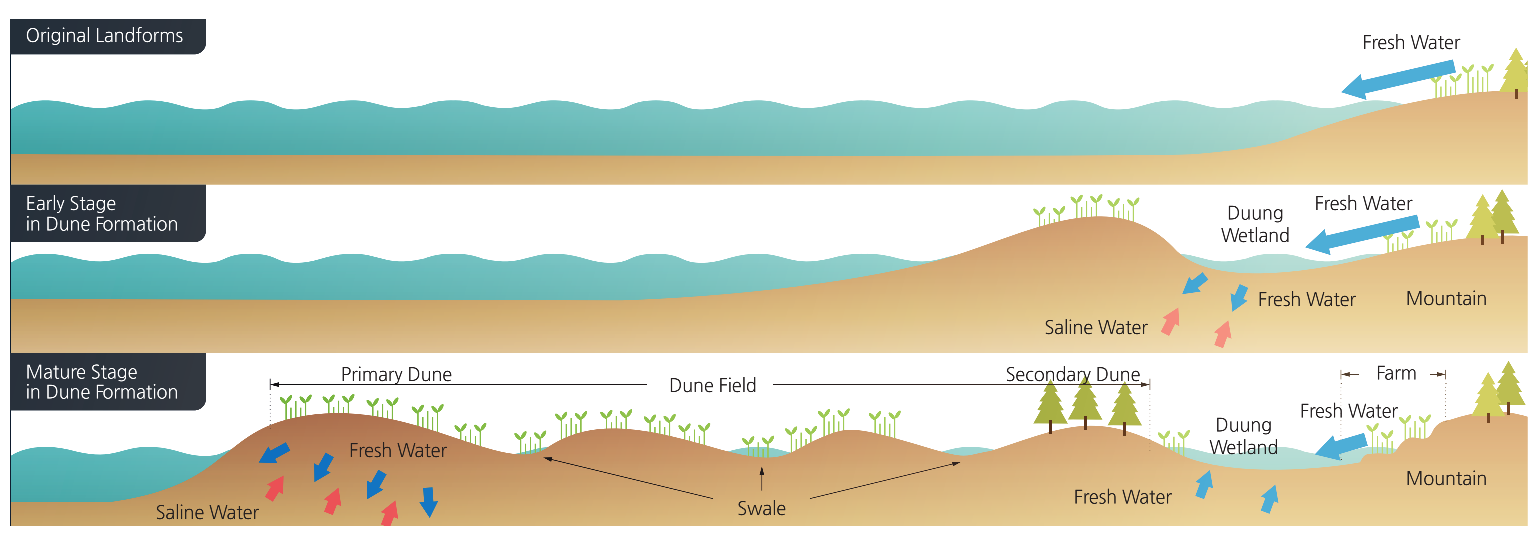
National Institute of Ecology (2020)

Example of Coastal Landforms (Sinduri Coastal Sand Dune)



National Geographic Information Institute (2015)

Formation of Coastal Dunes (Taean, Chungcheongnam-do)



Korean coastal landforms can be classified as rocky, sandy, or muddy. Sandy coasts are observed in bays where active sedimentation by waves occurs. Coastal depositional landforms include beaches, sand dunes, sand spits, sand bars, lagoons, and tombolo. Sandy coasts prevail in the eastern and western coastal areas, especially along regions exposed to the open sea, such as the Taean Peninsula.

Rocky coasts are indicative of erosional topography and develop along the headlands of mountainous and mound regions near the sea or where wave activity is strong. They are often found near major mountain ranges along the eastern and southern coasts. Sea cliffs, wave-cut platforms, and coastal terraces are also visible along the eastern coast of Korea. Muddy coasts are found along the western and southern coasts where flood and ebb tides are farther apart, wave activity is weak, and silt-sized particles are deposited. The largest tidal flats occur in Gyeonggiman (Gyeonggi Bay), where the tidal range is as large as 8–10 m. First-grade coastal landforms are evenly distributed along the coastline, mainly around relatively less-developed islands.

Although Korea does not currently have active volcanoes, vigorous volcanic activity occurred throughout the Quarternary period. As a result, distinct volcanic landforms can be observed in Jejudo, Baekdusan, Ulleungdo, Dokdo, and the Cheorwon Plateau.

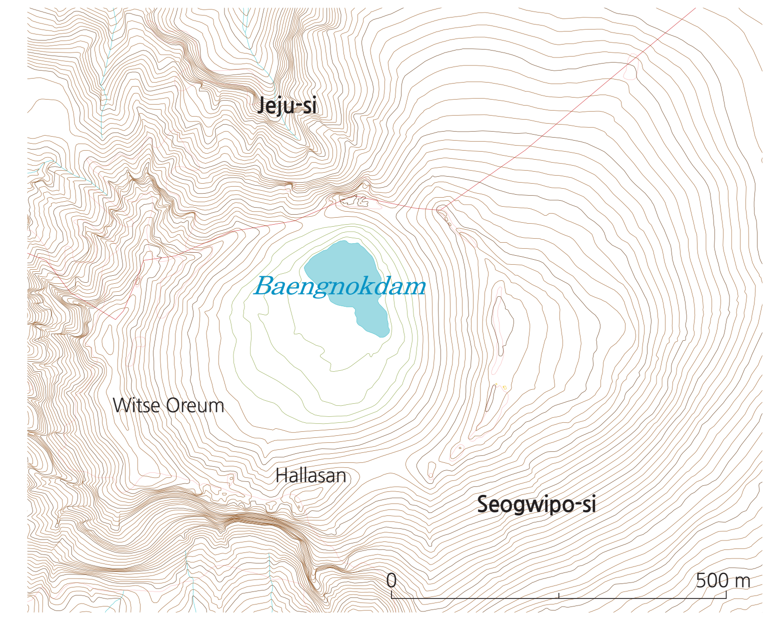
Jejudo, home to Hallasan, measures 73 km from east to west and 31 km from north to south with an area of 1,847 km^2. It is an ellipsoid shape extending E-NE and has gentle slopes, which is typical for a shield volcano. Jejudo was formed by hydro-volcanic activity during the Quaternary and displayed diverse volcanic landforms that are not generally seen on the Korean Peninsula. It has recently been designated as a geopark and a UNESCO World Heritage Site. This can be seen as an acknowledgment of Jejudo's landscape value as a natural resource.

Ulleungdo and Dokdo are islands formed by the exposed peaks of a submarine stratovolcano. Unlike Jejudo, these islands have undergone extensive erosional processes resulting in hilly topography. Ulleungdo is a massive volcano that stands at over 3,000 m from the seafloor to its highest peak, Seonginbong (the depth of water is 2,200 m; Seonginbong is 987 m above sea level). During the Tertiary period, basal eruptions produced an aspite that stood over 2,000 m high on the eroded continental plate. At the end of the Pliocene, overall denudation resulted in a wave-cut terrace, on top of which alkaline lava formed the volcanic body that can be seen today.

Limestone and Volcanic Rocks

Korea Institute of Geoscience and Mineral Resources (1995)

Volcanic Crater and Lake (Baengnokdam, Hallasan)



National Geographic Information Institute (2015)

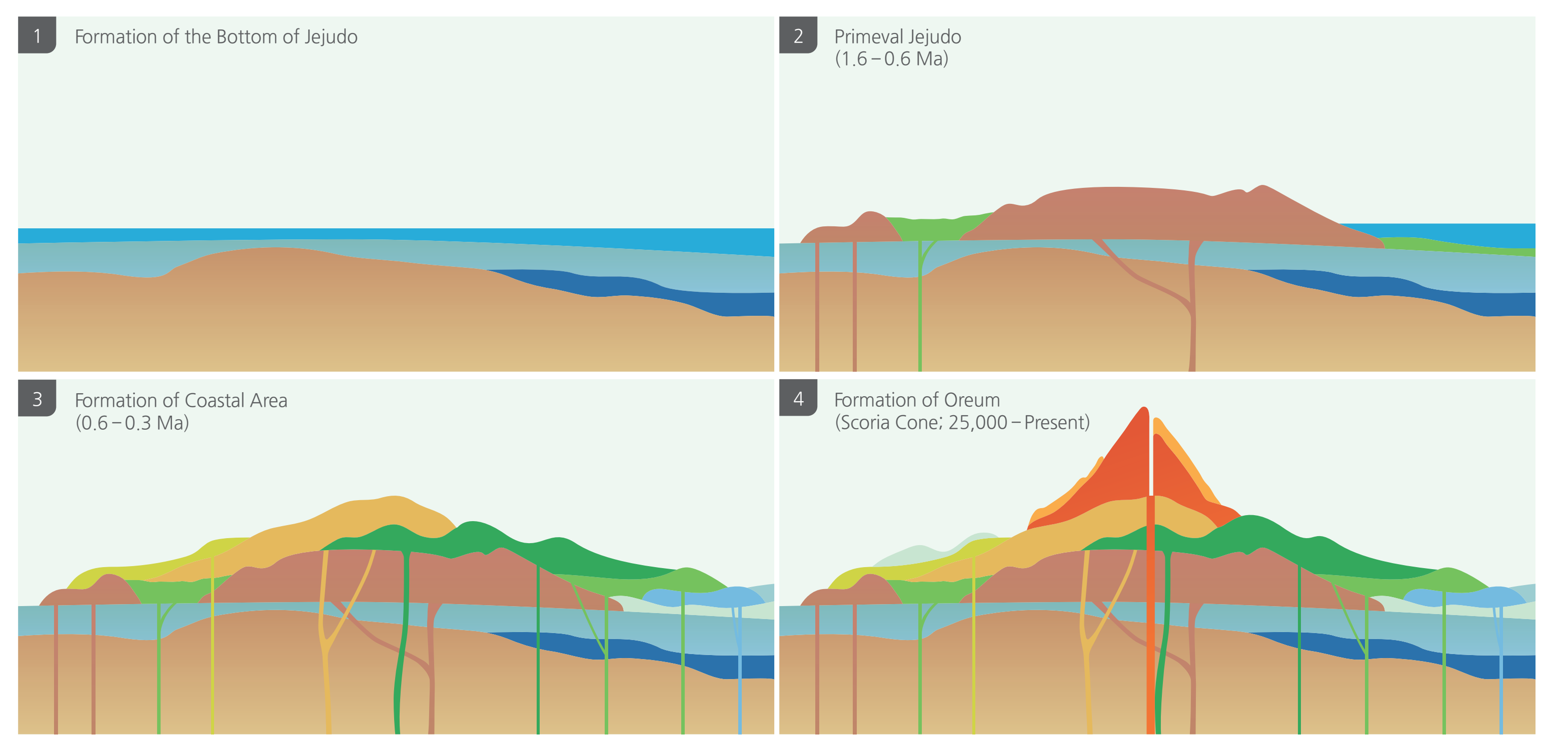
Limestone Cave (Samcheok, Gangwon-do)

Crater Lake (Baengnokdam, Hallasan, Jejudo)

Karren (Samcheok, Gangwon-do)

Columnar Joint (Daepodong, Seogwipo, Jejudo)

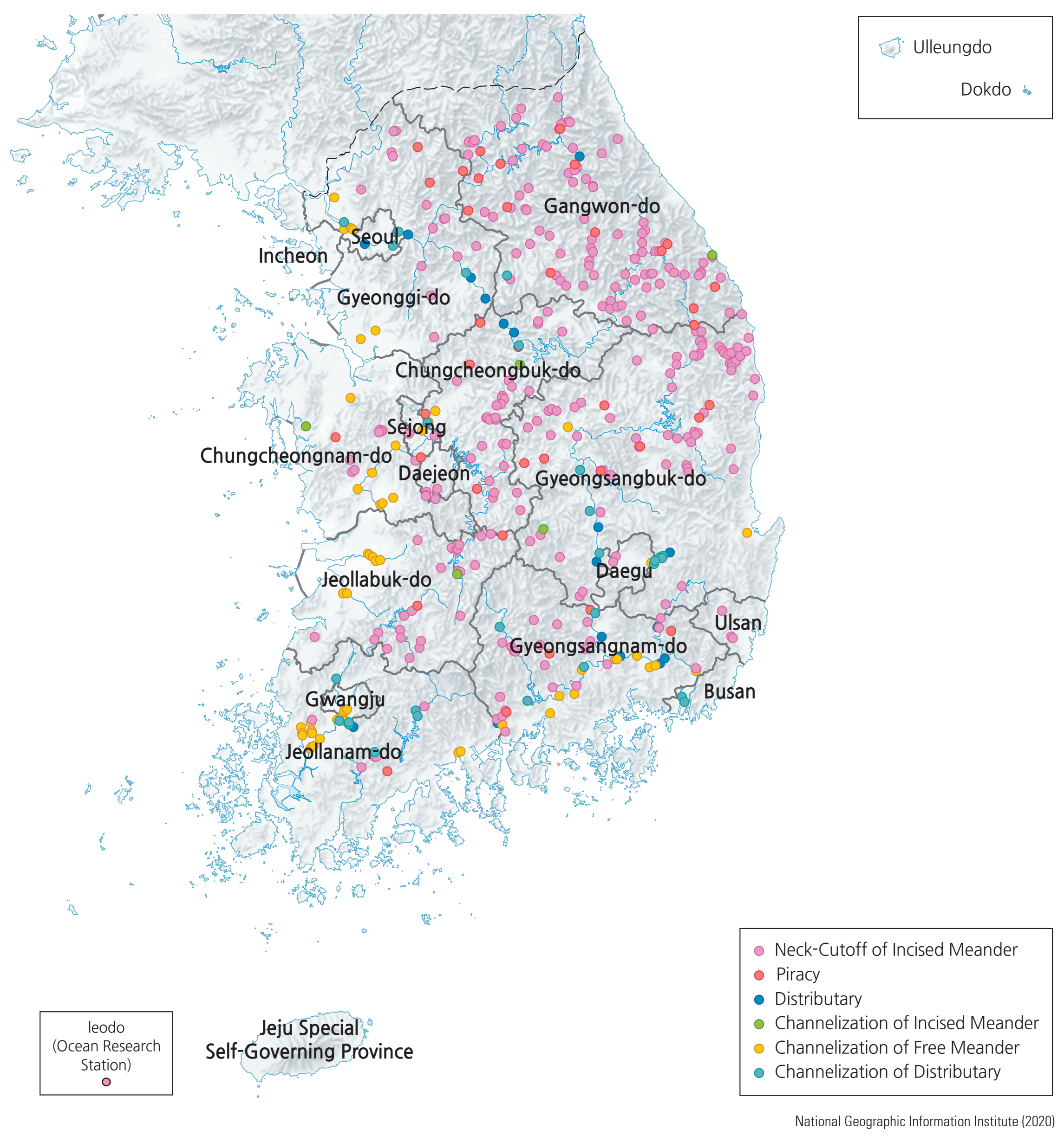
Development of Volcanic Islands (Jejudo)



Limestone is found in two geological formations in Korea: the Pyeongnam Basin and the Okcheon Basin. Both basins were formed during the Cambro-Ordovician. While the Pyeongnam Basin in North Korea displays more Cambrian features, the Okcheon Basin in South Korea has more Ordovician characteristics. Karst topography is concentrated around Taebaeksan, including regions such as Pyeongchang, Jeongseon, Samcheok, Jecheon, Yeongwol, Taebaek, Danyang, and Munkyeong. In particular, Yeongwol and Danyang are Korea's major limestone areas where notable features of karst–dolines (sinkholes), karrens, limestone caves–can be observed. Karrens are located in Hanbando-myeon of Yeongwol and Maepo-eup of Danyang, while dolines are commonly seen in Maepo-eup and Gagok-myeon of Danyang.

Karst topography can be categorized into three formations: concave features, convex features, and underground caves. Concave topography such as sinkholes, dolines, and uvalas emerges when acidic rain corrodes limestone or collapses limestone caves under the surface. This land is usually used for agriculture. On the other hand, convex topography refers to the features that remain after the dissolution of limestone, including flowstones, stalagmites, stalactites, and columns. These features, collectively known as karrens, are formed through the precipitation and recrystallization of calcium carbonate. Although large-scale karrens are not located on the Korean Peninsula, smaller features can be found around agricultural areas. Limestone caves develop as a result of groundwater runoff penetration below the surface. As the most well-known of the three types of karst topography, these caves often become tourist attractions. Prominent limestone caves in Korea include the Gosugul (Gosu Cave) of Danyang, the Gossigul (Gossi Cave) of Yeongwol, and the Hwanseongul (Hwanseon Cave) of Samcheok.

Distribution of Paleochannels in Korea

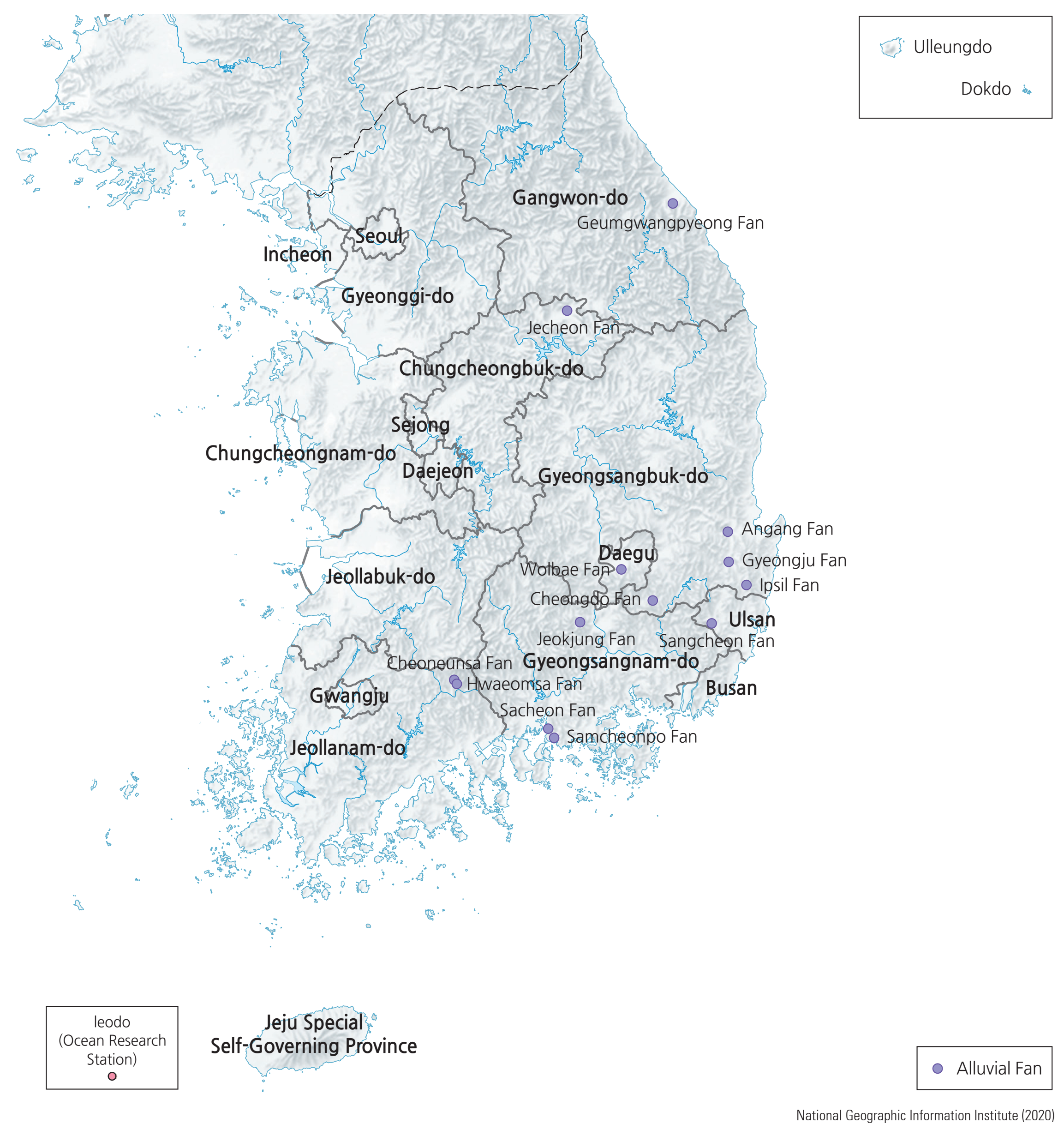


Paleochannels or abandoned channels are channels that cease to be part of an active river system. Paleochannels are ecological pathways that connect the land and river. They are spaces that contain clues that can indicate changes in the river channels and their neighboring areas. Today, paleochannels are destroyed or newly formed by human activities such as agriculture or other land use. Paleochannels are formed naturally, via neck-cutoff of incised meanders or free meanders, distributaries, and stream capture, or formed artificially, such as via channelization.

A total of 409 paleochannels have been identified in Korea. Of these, 321 formed naturally (266 by neck-cutoff of incised meanders, 38 by stream capture, and 17 by distributaries) and 86 formed artificially (5 by channelization of incised meanders, 55 by channelization of free meanders, and 28 by channelization of distributary channels).

Paleochannels created by neck-cutoff of incised meanders are well distributed throughout Korea, except on the extensive plain in the coastal area. The upstream of Nakdonggang, tributaries of Namhangang (Dalcheon and Pyeongchanggang), a tributary of Nakdonggang (Banbyeoncheon), a tributary of Bukhangang (Soyanggang), and Wangpicheon on the East Coast are examples of this kind of paleochannel. Paleochannels by capture are easily found in the mountain areas experiencing active uplifts, such as Hangang, Nakdonggang, Geumgang, and Seomjingang. Distributary paleochannels are mainly found in drainage basins with extensive areas such as midstream and downstream of Hangang and Nakdonggang. Paleochannels created by channelizing free meanders are mainly found midstream and downstream of relatively large rivers such as Mangyeonggang, Yeongsangang, and tributaries of Yeongsangang (Sampocheon, Hampyeongcheon, and Gomakwoncheon) and Geumgang (Nonsancheon and Mihocheon). Geumhogang around Gyeongsan-si, Gyeongsangbuk-do, shows the most frequent distribution of paleochannels by channelization of distributaries. Agricultural land and forest mainly occupy the paleochannels formed by the neck-cutoff of incised meanders and by stream capture, while wetlands and water appear in the other types of the paleochannels.

Distribution of Large Alluvial Fans (> 2 km²) in Korea



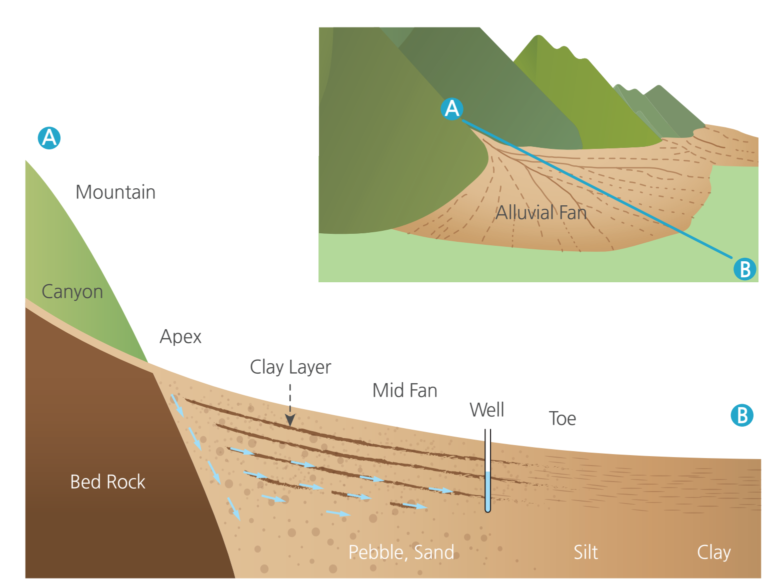
An alluvial fan is formed by the deposition of sediments at a valley mouth by a river flowing from a narrow valley in the mountain to a wide flat area. Alluvial fans can be found in almost all climatic zones, from low latitude tropical areas to high latitude periglacial areas and arid and semi-arid areas. Formation of an alluvial fan was thought to require a knickpoint. Recent studies have argued that channel change from a narrow valley to a wide flat area resulting in changes in discharge and flow velocity leads to the formation of an alluvial fan, whether there is a knickpoint or not.

Alluvial fans in Korea were interpreted as a piedmont or a pediment due to thin sediment and atypical form. Recent studies have reported several alluvial fans in Korea. The alluvial fan in Geumgwangpyeong is in Gangneung-si Gangwon-do; the one in Jecheon is in Jecheon-si, Chungcheonbuk-do. The alluvial fan in Angang is in Gyeongju; the one in Ipsil is in Gyeongju-si, Gyeongsangbuk-do. The alluvial fan in Sangcheon is in Ulju-gun, Ulsan while the one in Cheongdo is in Cheongdo-gun, Gyeongsangbuk-do.

The alluvial fan in Wolbae is in Dalseo-gu, Daegu and another one can be found in Jeokjung in Hapcheon-gun, Gyeongsangnam-do. Alluvial fans found at Cheoneunsa and Hwaeomsa in Gurye-gun, Jeollanam-do and at Sacheon and Samcheonpo in Sacheon-si, Gyeongsangnam-do were reported as the representative alluvial fans with an area of > 2 km² in Korea.

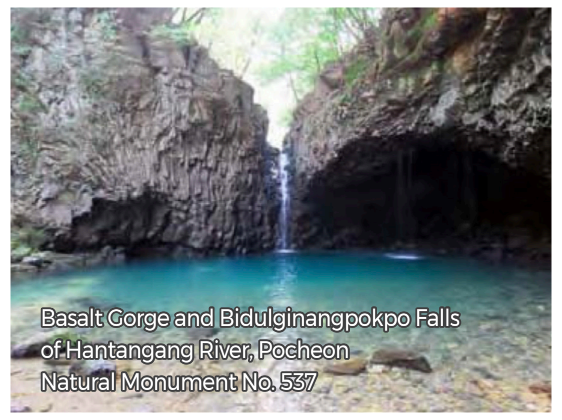
Alluvial fans in Korea can be categorized into three types: fans by a small river flowing from a narrow mountain valley to the relatively extensive bottom of an erosional basin (Geumgwangpyeong, Jecheon, Cheongdo, Wolbae, and Jeokjung); fans by a tributary flowing to the extensive flood plain of a main river (Cheoneunsa, Hwaeomsa, Sacheon, and Samcheonpo); and fans by a small river laterally flowing to the interior area of a linear fault valley (Gyeongju, Angang, Ipsil, and Sangcheon).

Formation of Alluvial Fan




Eoreumgol Ice Valley in Nammyeong-ri, Miryang, Natural Monument No. 224

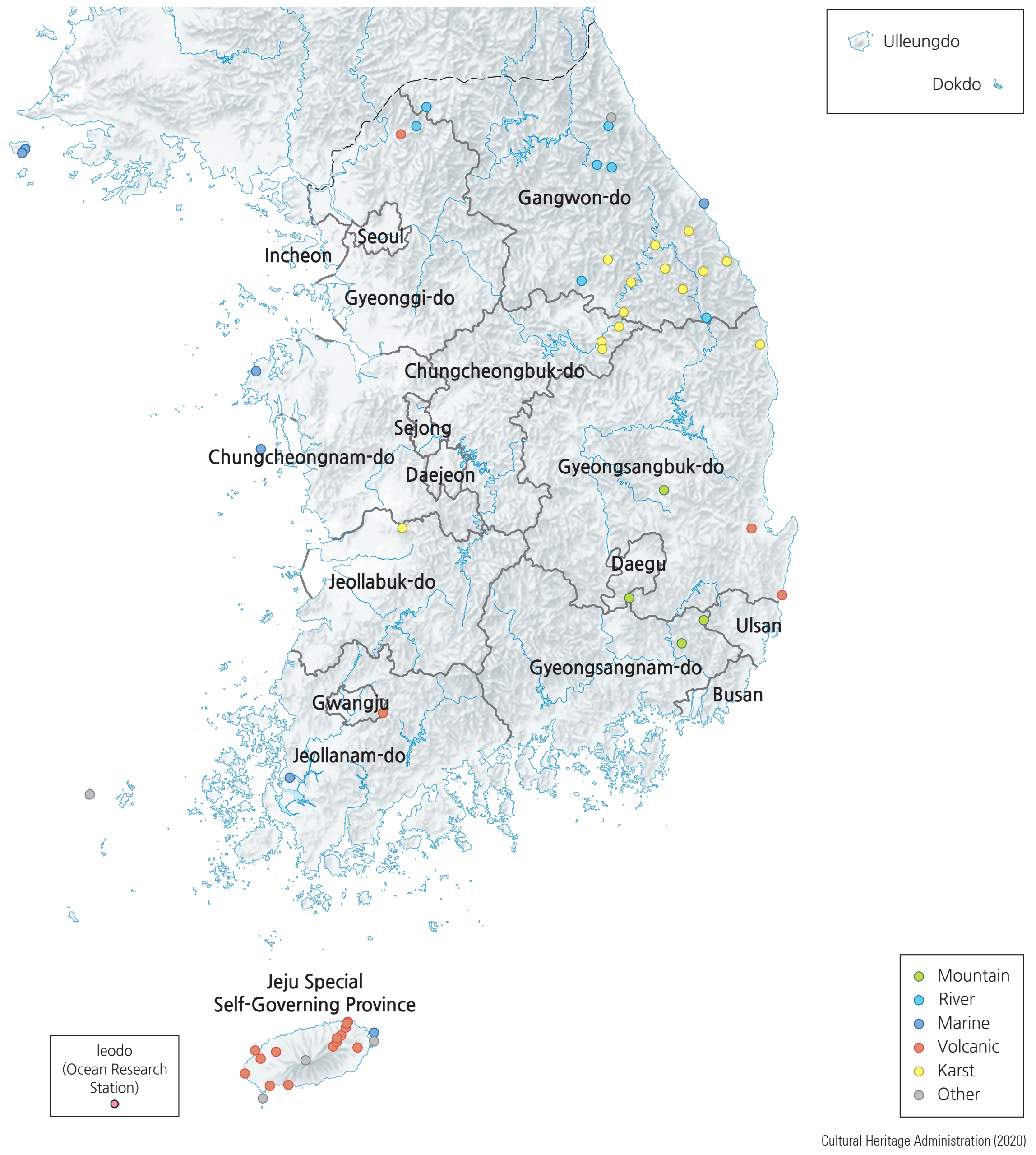

Block Stream in Biseulsan Mountain, Dalseong, Natural Monument No. 435


Basalt Gorge and Bidulginangpokpo Falls of Hantangang River, Pocheon, Natural Monument No. 537


Kongdol Pebble Beach in Nampo-ri, Baengnyeongdo Island, Ongjin, Natural Monument No. 392


Potholes on Yoseonam Rock in Mureung-ri, Yeongwol, Natural Monument No. 543

Distribution of Geomorphological Resources in the Natural Monuments of Korea



Cultural Heritage Administration (2020)


Gatbawi Sea Cliff and Tafoni, Mokpo, Natural Monument No. 500


Geomun Oreum Volcanic Cone in Seonheul-ri, Jeju, Natural Monument No. 444


Seongnyugul Cave, Uljin, Natural Monument No. 155


Nodongdonggul Cave, Danyang, Natural Monument No. 262


Hongdo Island Natural Reserve, Natural Monument No. 170


Dokdo Island Natural Reserve, Natural Monument No. 336


Gimnyeonggul and Manjanggul Lava Tubes, Jeju, Natural Monument No. 98

Cultural heritage in Korea is classified into monuments, folklore, and tangible and intangible cultural heritage. Monuments bear great historic, cultural, scientific, aesthetic, or academic value, through which the history of a nation or the secrets to the creation of the earth can be identified or revealed.

Natural monuments mostly centered around animals or plants in the past. In recent years, various geomorphological and geological resources have been designated and managed as natural monuments. As of 2020, a total of 461 sites are designated as natural monuments, categorized as follows: cultural and historical heritage (monuments, folklore, life, history, and religion), bioscience heritage (typicality, taxonomy, chorology, biota, genetics, rareness, and specificity), geoscience heritage (paleobios, living organisms, natural phenomena, geomorphological and geological resources, and natural caves), cultural and natural heritage (landscape and scientific characteristics, and symbolism), and natural science (special biota and marine biota).

There are 56 geomorphological natural monuments in Korea, including mountain, fluvial, coastal, volcanic, karst, and other unique or complex landforms. There are four mountain landforms, including the Eoreumgol Ice Valley in Nammyeong-ri, Miryang-gun (Natural Monument No. 224) and a block stream on Biseulsan, Dalseong-gun (Natural Monument No. 435). There are seven fluvial natural monuments, including Basalt Gorge and Bidulginangpokpo Falls of Hantangang, Pocheon-gun (Natural Monument No. 537) and potholes on Yoseonam Rock in Mureung-ri, Yeongwol-gun (Natural Monument No. 543). There are seven coastal natural monuments, such as Kongdol Pebble Beach in Nampo-ri, Baengnyeongdo, Ongjin-gun (Natural Monument No. 392) and Gatbawi Sea Cliff and associated tafone in Mokpo (Natural Monument No. 500). There are 18 volcanic natural monuments, including the Gimnyeonggul and Manjanggul lava tubes in Jejudo (Natural Monument No. 98) and the Geomunoreum volcanic cone in Seonheul-ri, Jejudo (Natural Monument No. 444). There are 14 karst natural monuments, including Seongnyugul Cave, Uljin-gun (Natural Monument No. 155) and Nodongdonggul Cave, Danyang-gun (Natural Monument No. 262). Hongdo Island Natural Reserve (Natural Monument No. 170) and Dokdo Island Natural Reserve (Natural Monument No. 336) are natural monuments classified as complex landforms.

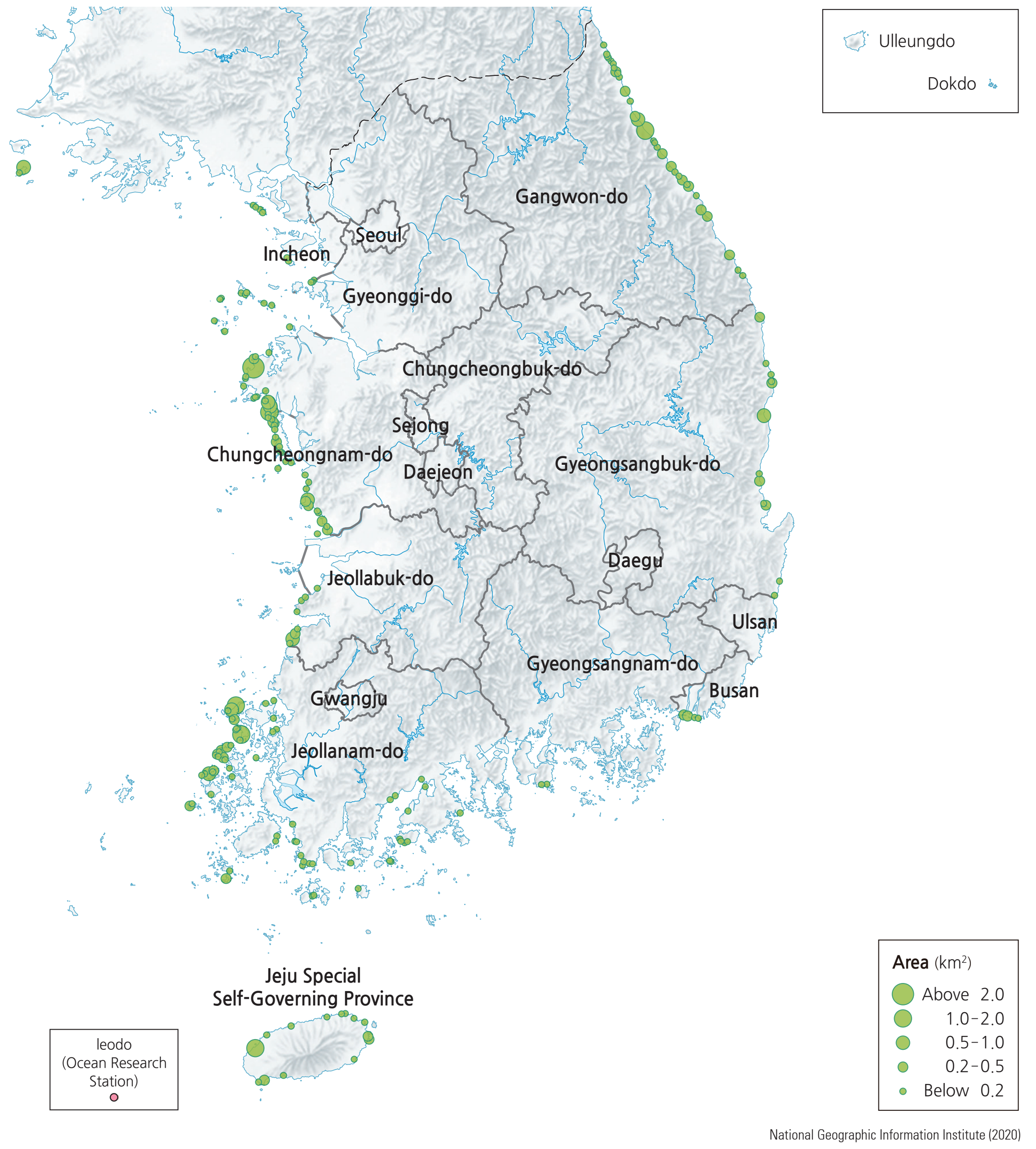

Bigeummyeongsa Dune


Geumilmyeongsa Dune


Woncheong Dune


Yangyangdongho Dune

Distribution of Coastal Sand Dunes in Korea



National Geographic Information Institute (2020)

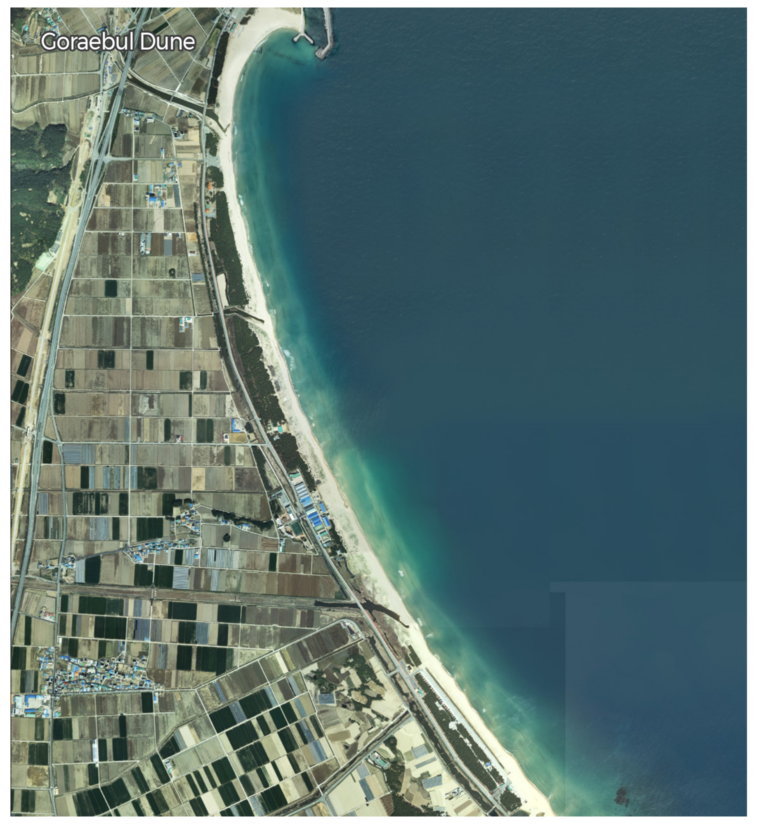

Hyeopjae Dune


Dadaepo Dune


Bangameori2 Dune


Sangju Dune


Seopori Dune


Goraebul Dune


Gochangmyeongsa Dune

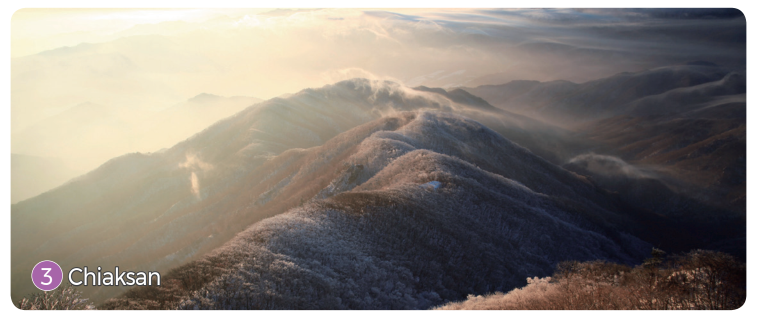
A coastal sand dune is a hill consisting of sand blown from a sandy beach and deposited behind the beach. It is located in a transitional zone between terrestrial and marine environments. Thus, a coastal sand dune is ecologically important, serving as a natural breakwater to reduce the intensity of natural hazards and their damage. Coastal sand dunes are sensitive to environmental changes. When the coastline retreats due to sea-level rise, coastal sand dunes also retreat. Therefore, these dunes not only maintain the coastal landform but also contain information on paleoenvironmental changes.

A total of 199 coastal sand dunes have been identified. Sixty-three coastal sand dunes are located in Jeollanam-do, which has a complex and long coastline and many islands, including the Bigeummyeongsan Dune in Jidang-ri, Bigeum-myeon, Sinan-gun and the Geumilmyeongsa Dune in Wolsong-ri, Geumil-eup, Wando-gun. Chungcheongnam-do has the second most coastal sand dunes (45 dunes), including the Woncheong Dune in Woncheong-ri, Nam-myeon, Taean-gun. Thirty-one coastal sand dunes are found in Gangwon-do where sand beaches are well developed, including the Yangyangdongho Dune in Dongho-ri, Yangyang-eup, Yangyang-gun. Seventeen coastal sand dunes were identified mostly on islands in Incheon, including the Seopori Dune in Seopo-ri, Deokjeok-myeon, Ongjin-gun. There are 14 in Jeju Special Self-Governing Province, including the Hyeopjae Dune in Hyeopjae-ri, Hallim-eup, Jeju-si, and 12 in Gyeongsangbuk-do, including the Goraebul Dune in Byeonggok-myeon, Yeongdeok-gun. Eight coastal sand dunes are found in Jeollabuk-do, including the Gochangmyeongsa Dune in Sangha-myeon, Gochang-gun. Busan and Gyeonggi-do have four and three coastal sand dunes, respectively. Only two coastal sand dunes are located in Namhae-gun, Gyeongsangnam-do.

Eighty-one of these 199 dunes are distributed in island areas, including Jejudo, and the rest are along the Peninsula's coast. Sinan-gun, Jeollanam-do, has the most coastal sand dunes (30 coastal sand dunes), followed by Taean-gun (29 coastal sand dunes), Chungcheongnam-do. The Sinduri Dune in Sindu-ri, Wonbuk-myeon, Taean-gun, Chungcheongnam-do is the most extensive coastal sand dune at approximately 2.01 km^2, followed by the Hyeopjae Dune (1.80 km^2) in Hyeopjae-ri, Hallim-eup, Jeju-si, Jeju Special Self-Governing Province. Most of the coastal sand dunes in Korea are less than 1 km^2 in size.


1 Seoraksan


2 Odaesan


3 Chiaksan


7 Gyeryongsan

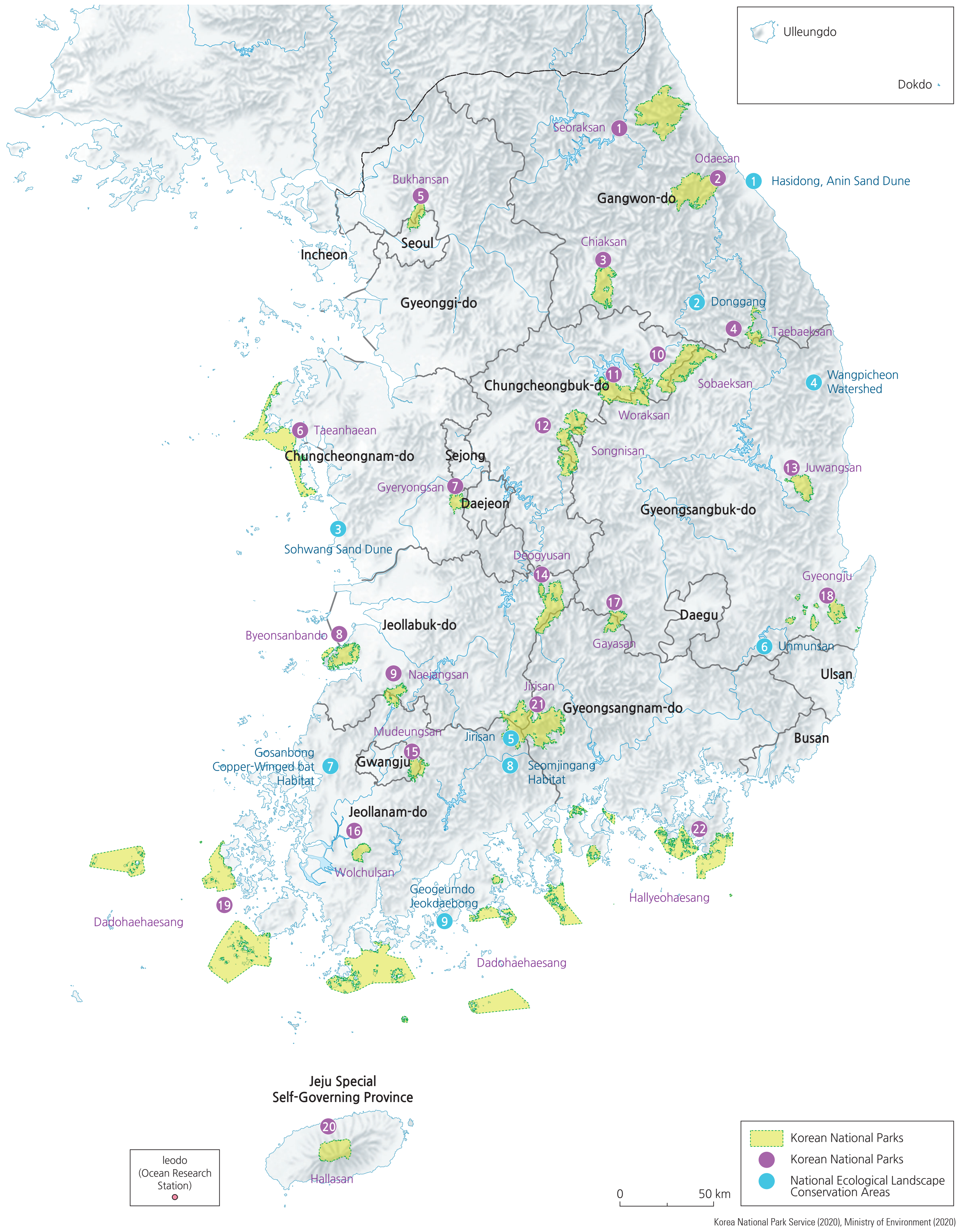

10 Sobaeksan


17 Gayasan


20 Hallasan


1 Hasidong, Anin Sand Dune

Korean National Parks·National Ecological Landscape Conservation Areas



Korea National Park Service (2020), Ministry of Environment (2020)


2 Donggang


3 Sohwang Sand Dune

Since the designation of Jirisan National Park as the first national park in Korea on December 29, 1967, a total of twenty-two national parks have been designated and protected. Except for Hallasan National Park, which is managed directly by Jeju Special Self-Governing Province, the National Park Authority (established in 1987) manages all the national parks. The total area of the national parks is 6,726 km², of which 3,973 km² are land, and 2,754 km² are sea. Among the twenty-two national parks, seventeen are associated with mountains, four are coastal, and one, Gyeongju National Park, is urban. Taebaeksan was the last to be designated as a national park on August 22, 2016.

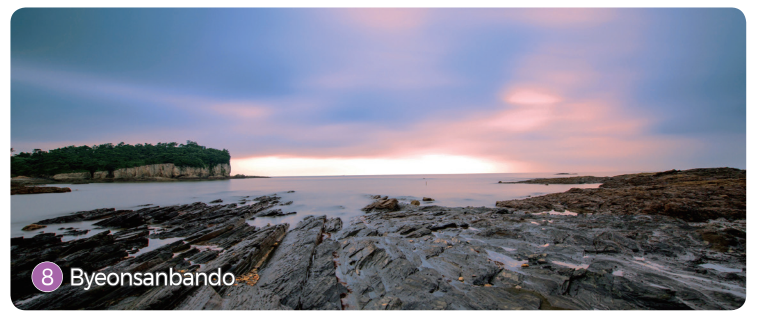
Other than national parks, various regions have been selected and designated as natural parks to protect ecosystems and cultural landscapes. Among these natural parks, some prominent examples include provincial and county parks, as well as ecological landscape conservation areas. Provincial parks are representative areas of natural ecosystems and landscapes in metropolitan cities and provinces. As of 2019, there are thirty provincial parks (total area 1,129 km²) that have been designated. County parks are representative of local districts (si and gun) with a total of twenty-seven parks (total area 238 km²) currently being operated. Such natural parks increase the value of the natural ecosystems and thereby provide the local community with opportunities for regional development. Lately, the number and area of the provincial and county parks has been increasing as provincial municipalities attempt to promote regional development and tourism.

National Ecological Landscape Conservation Areas are chosen and managed based on their geological-geomorphological value, vegetational importance, ecological recognition, or necessity for conservation. These areas present significant value for conservation and scholarly research on biodiversity by maintaining the integrity of natural ecosystems. The regions possess distinct geological or topographical characteristics that are protected for research and scenic sustenance. They also represent diverse ecosystems and possess exceptional natural landscapes such as rivers, mountains, and valleys. Nine areas are currently designated and protected across the country by the central government, and 24 by local governments.


4 Taebaeksan

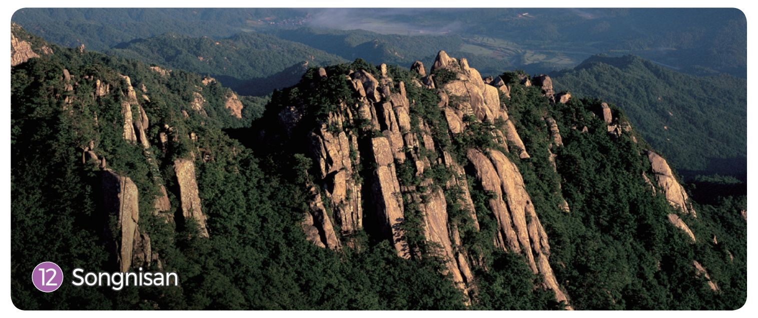

5 Bukhansan


6 Taeanhaean


8 Byeonsanbando


9 Naejangsan


11 Woraksan

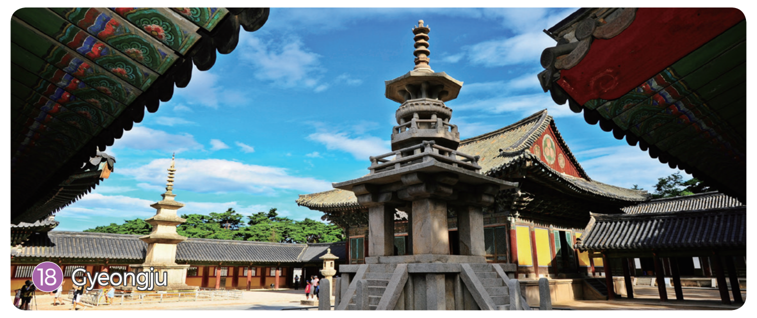

12 Songnisan


13 Juwangsan


14 Deogyusan


15 Mudeungsan


16 Wolchulsan


18 Gyeongju


19 Dadohaehaesang


21 Jirisan


22 Hallyeohaesang


4 Wangpicheon Watershed


5 Jirisan

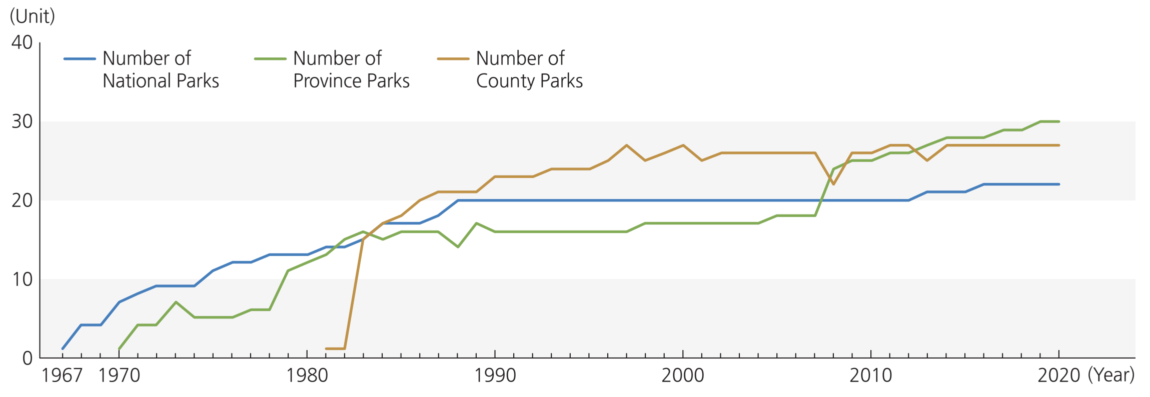

6 Unmunsan


7 Gosanbong Copper-Winged Bat Habitat


8 Seomjingang Eurasian Otter Habitat

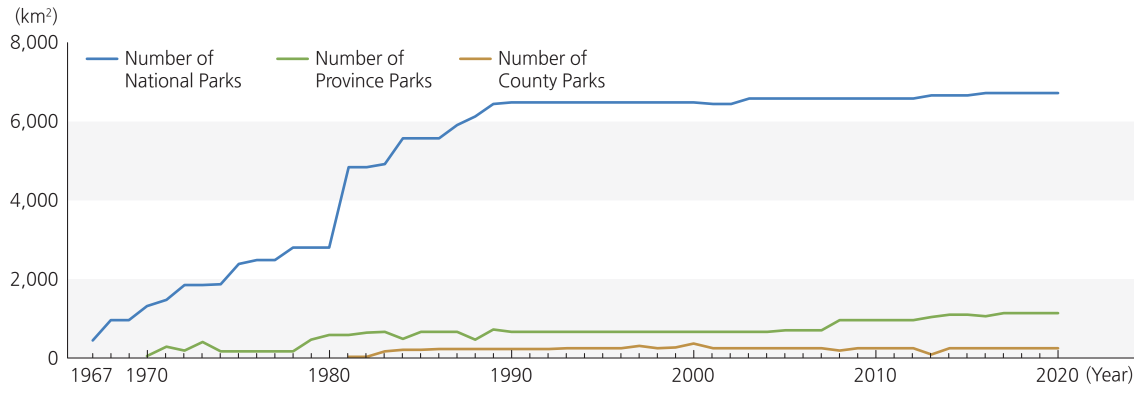

9 Geogeumdo Jeokdaebong

Number of Natural Parks by Year



Korea National Park Service (2020)

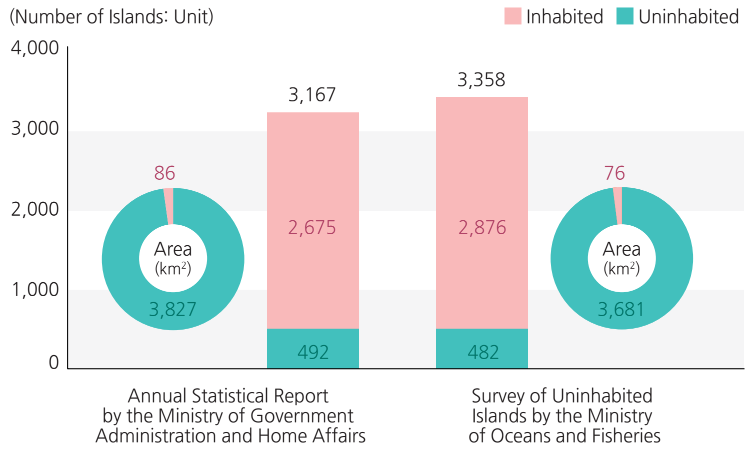
Area of Natural Parks by Year



Korea National Park Service (2020)

Among Korea's 3,167 islands, all accessible and large islands are occupied by residents, while 2,675 small, remote islands remain uninhabited. Uninhabited islands are important to national territory and economics, as they are crucial defining base points for national boundaries and exclusive economic zones. From an ecological or environmental perspective, uninhabited islands are protected from human disturbance, so their conservation status is higher than that of inhabited islands. From an academic point of view, uninhabited islands have special geologic, topographic, landscape, and ecosystem features that provide opportunities to investigate changes in climate, land surface features, and sea level. Also, uninhabited islands are more affected by ocean currents and sea waves, thus providing easier observation of various coastal topographic features that result from erosional and depositional processes. Erosional landforms such as wave-cut platforms, sea cliffs, sea caves, sea arches, sea stacks, and notches are predominantly located where the rocky coasts of uninhabited islands meet the open sea. By contrast, islands located in inland seas often have beaches and tidal flats.

Islands Statistics



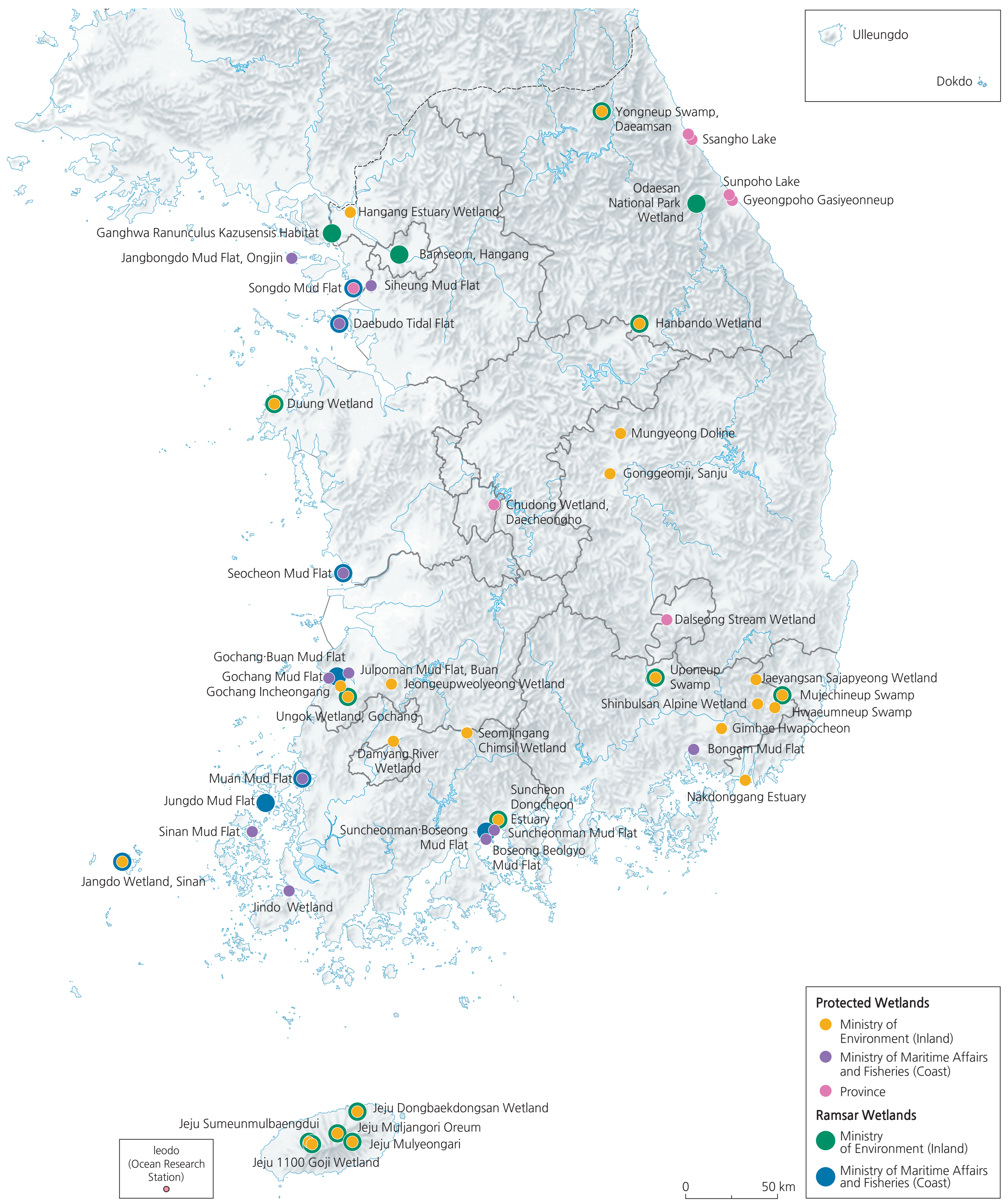
Ministry of Environment (2015)

Wetlands Designated by the Ministry of Environment

Name of Wetland	Area (km^2)	Characteristics	Designation Date (Ramsar Enlisted Date)
Nakdong Estuary	37.718	Habitat for migratory birds	1999.08.09
Yongneup of Daeamsan	1.360	The one and only highland moor	1999.08.09 (1997.03.28)
Uponeup	8.651	The oldest natural wetland	1999.08.09 (1998.03.02)
Moojechineup	0.184	Mountain wetland	1999.08.09 (2007.12.20)
Mulyeongari Oreum	0.309	Top of scoria cone	2000.12.05 (2006.11.18)
Hwaeomneup	0.124	Mountain wetland	2002.02.01
Duung	0.067	Wetland developed behind the coastal dune/habitat for rare plant and animal species	2002.11.01 (2007.12.20)
Sinbulsan Alpine Wetland	0.308	Habitat for rare plant and animal species	2004.02.20
Damyang River	0.981	Habitat for endangered plant and animal species	2004.07.08
Jangdo Island Alpine Wetland	0.090	The only mountain wetland in island	2004.08.31 (2005.03.30)
Hangang Estuary	60.668	Natural habitat for variety of species	2006.04.17
Jaeyaksan Sajapyeong	0.587	Excellent landscape, well developed peat	2006.12.28
Jeju 1100 Goji	0.126	Mountain wetland/habitat for endangered plant and animal species	2009.10.01 (2009.10.12)
Jeju Muljangori Oreum	0.610	Crater lake/habitat for endangered plant and animal species	2009.10.01 (2008.10.13)
Jeju Dongbaekdongsan	0.590	Rich variety of species	2010.11.12 (2011.03.14)
Gochang Ungok	1.930	Rich variety of species/habitat for endangered plant and animal species	2011.03.14 (2011.04.07)
Sangju Gonggeomji	0.264	Rich variety of species/habitat for endangered plant and animal species	2011.06.29
Yeongwol Hanbando	2.772	Eight legally protected species	2012.01.23 (2015.05.13)
Jeongeup Weolyeong	0.375	Six Endangered Wildlife/ rich variety of species	2014.07.24
Jeju Sumeunmulbaengdui	1.175	Highland wetland, rich variety of species	2015.07.01 (2015.05.13)
Suncheon Dongcheon Estuary	5.656	Riverine wetland, rich biodiversity, number of Endangered Wildlife	2015.12.24 (2016.01.20)
Seomjingang Chimsil Wetland	2.037	Rich variety of species/habitat for Endangered Wildlife (Otter, Korean terrapin)	2016.11.07
Mungyeong Doline	0.494	Doline wetland	2017.06.15
Gimhae Hwapocheon	1.244	Rich variety of species/habitat for Endangered Wildlife	2017.11.23
Gochang Incheongang	0.722	Rich variety of species/habitat for Endangered Wildlife	2018.10.23
Total	129.042		

Ministry of Environment (2020)

Wetlands



Ministry of Environment (2020)

Under the Act on the Conservation and Management of Uninhabited Islands established in 1997, conservation efforts have been carried out for uninhabited islands with particular landscape value or ecological importance. As of 2018, 1,360 islands have been investigated. As of 2020, 257 islands are registered as special islands for conservation. These special islands are mainly located in Jeollanam-do and Gyeongsangnam-do, as coastlines with long, narrow inlets are very prominent in these regions.

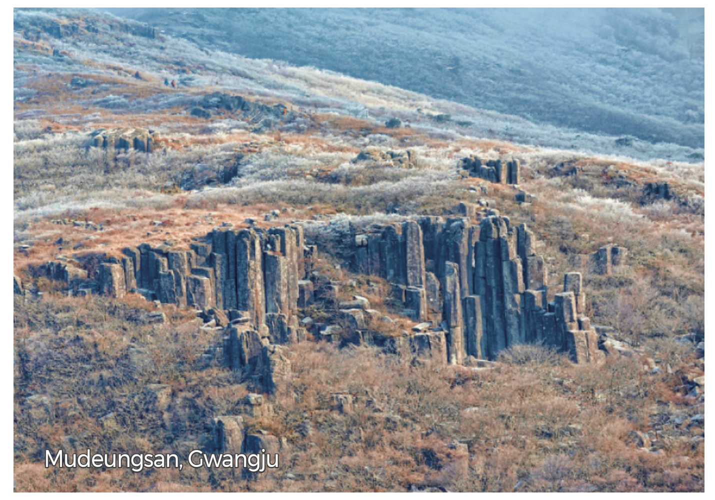
Wetlands are a haven for biodiversity and provide an ecological buffer zone for hydrological and atmospheric processes. Korea has been using wetland monitoring to select certain wetlands as subjects for its conservation plans. Currently, 25 protected wetlands (total area of 129 km^2) have been designated by the Ministry of Environment: 12 along the seaside (1,416 km^2) by the Ministry of Ocean and Fisheries, and seven (8.3 km^2) by provinces. The Convention on Wetlands of International Importance (the Ramsar Convention) took place in Ramsar, Iran in 1971 and was enacted in 1975. It was intended to protect internationally important wetlands that function as habitats for animal and plant wildlife—waterfowl in particular. As of 2019, 171 countries have joined the Convention, and Korea has been a member since 1997. Twenty-three registered wetlands in Korea are recognized by the Ramsar Convention, including Gangwon-do Daeamsan Yongneup Swamp, Changnyeong Uponeup Swamp, Jangdo Wetland and Suncheonman in Jeollanam-do, Chungnam Taean Duung Wetland, Ulsan Mujechi Wetland, Muan Tidal Flat, Ganghwa Maehwamareum Habitat, Odaesan Wetland, Yeongwol Hanbando Wetland, and Mulyeongari, Muljangori Oreum, and Sumeunmulbaengdui in Jejudo.

Wetlands Designated by the Ministry of Oceans and Fisheries

Name of Protected Tidal Flats	Area (km^2)	Characteristics	Designation Date (Ramsar Enlisted Date)
Muan Tidal Flat	42.00	Rich biodiversity and high geological value	2001.12.28 (2008.01.14)
Jindo Tidal Flat	1.44	Excellent landscape with rich biodiversity/Habitat for migratory birds	2002.12.28
Suncheon Bay Tidal Flat	28.00	Habitat for hooded crane with developed ecotourism	2003.12.31 (2006.01.20)
Boseong Tidal Flat	31.85	Well preserved nature with rich fish resources	2003.12.31 (2006.01.20)
Ongjin Jangbongdo	68.40	Habitat for rare migratory bird species with rich biodiversity	2003.12.31
Buan Julpo Tidal Flat	4.90	Well preserved nature with rare migratory snipe species	2006.12.15 (2010.02.01)
Gochang Tidal Flat	64.66	Vast area with landscape and water resources	2007.12.31 (2010.12.13)
Seocheon Tidal Flat	68.09	Well preserved nature and habitat of oyster catcher	2008.01.30 (2010.09.09)
Sinan Tidal Flat	1,100.86	Rich variety of species/Habitat for Endangered Wildlife	2010.01.29 (2011.09.01)
Bongam Tidal Flat	0.10	Wetland in urban area, habitat for rare and Endangered Wildlife	2011.12.16
Siheung Tidal Flat	0.71	Wetland located inside bay, habitat for rare and Endangered Wildlife	2012.02.17
Daebudo Tidal Flat	4.53	Rich variety of species/Habitat for Endangered Wildlife	2017.03.22
Total	1415.54		

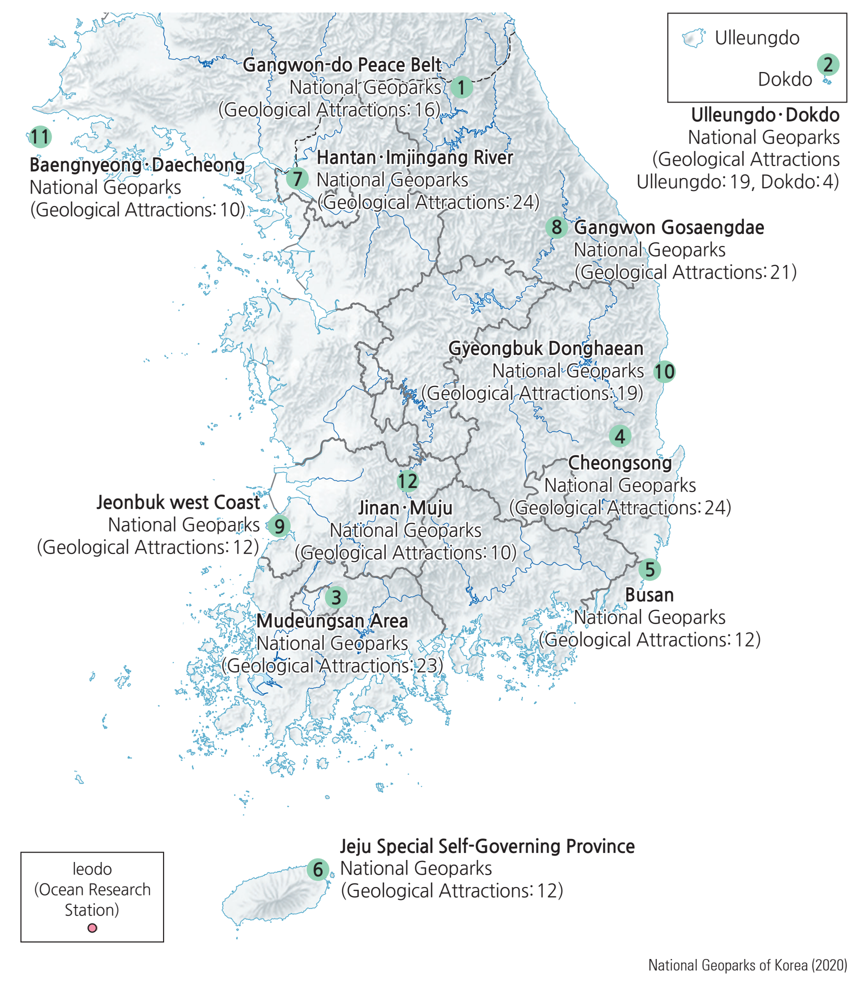
Ministry of Environment (2020)


Hantangang, Cheorwon


Mudeungsan, Gwangju


Taejongdae, Busan

National Geopark Network



National Geoparks of Korea (2020)


Gumunso, Taebaek


Kokkiribawi, Ulleungdo


Yongyeon Waterfall, Cheongsong


Sanbangsan, Jeju

National Geoparks target areas with geological and geomorphological significance to carry out conservation activities that meet the criteria prescribed in a particular country (in the case of Korea, the Ministry of Environment certification). National and World Geoparks are almost identical in their assessment and certification procedures, management structures, and operating systems. As of 2020, Korea operates 12 National Geoparks: Jejudo, Ulleungdo · Dokdo, Busan, Gangwon Peace Geopark, Cheongsong-gun, Mudeungsan, and Hantangang · Imjingang. Many more candidates are waiting to be designated.

The whole of Jejudo, with its diverse volcanic landforms and geological resources, is a National and International Geopark. As the first National Geopark of Korea, Jejudo is often referred to as a "Museum of volcanoes" as it boasts a variety of unique volcanic landforms. There are about 360 cinder cones above the surface and about 160 lava tubes and caves that are located underground. It is a rare phenomenon to see so many volcanic features including underground tubes on one small island.

Ulleungdo and Dokdo are volcanic islands that provide essential clues explaining the formation of the East Sea. They are very important in various research fields, including geology, biology, oceanography, and history. Seonginbong (986.7 m)—the highest peak of Ulleungdo—is located at the center of the island. Ulleungdo also has the Nari Basin, formed by a depressed caldera, and small peaks called Albong. Some other geosites of Ulleungdo and Dokdo include Dodong and Jeodong Beach with well-developed sea cliffs and wave-cut platforms, Gooksu Rock with its columnar joints, Daepoonggam, Elephant Rock, Turtle Rock, Bongrae Waterfall, Songgot Peak, Seonginbong Primitive Forest, and Mongdol Beach. On these two tiny islands, there is a total of 23 geosites.

Busan has a variety of diverse landscape features such as coasts, mountains, and estuaries. Consequently, it has a rich geo-heritage and a wealth of cultural assets. Nakdong Estuary, Songdo Peninsula, Taejongdae, Oryukdo-Igidae, Changsan, and Geumjeongsan are some of the 12 geosites in Busan.

Gangwon Peace Geopark was designated to transform the areas around the DMZ from a symbol of Cold War hostility to a symbol of peace. It contains a rich geological and geomorphological heritage and spans across Cheorwon-gun, Hwacheon-gun, Yanggu-gun, Inje-gun, and Goseong-gun. There are 16 geosites, including the Cheorwon Lava Plateau, Haean Basin (Punch Bowl), and Potholes of Naerincheon.

Cheongsong Geopark is famous for its magnificent landscape and plenty of historical, cultural, ecological, and archaeological heritage sites. Among 24 geosites, major locations include Yongchu Waterfall, Jeolgu Waterfall, Yongyeon Waterfall, Dalgi Waterfall, Juwang Cave, and Cheongsong Ice Valley.

Mudeungsan Area Geopark is located in Gwangju, Hwasun-gun, and Damyang-gun. It has 23 geosites such as the Seosokdae Columns and the Seoyuri Dinosaur Fossil Site, and 42 cultural heritage sites such as Mujin Goseong and Unjusa Temple.

Hantangang · Imjingang Geopark includes Jaein Waterfall and Jwasang Rock of the Mesozoic, Jeogbyeok Columnar Joint, Dangpo Castle, Yeoncheon Jeongok-ri Prehistoric Site, Baegeui-ri Sedimentary Layer, Dongmak-ri Tuff, Pillow Lava in Auraji of Yeoncheon, Hwajeokyoun Pond, Art Valley, and Gurai Valley in Pocheon-si. It has 24 geosites overall.

Gangwon Gosaengdae is located in Taebaek-si, Yeongwol-gun, Jeongseon-gun, and Pyeongchang-gun, Gangwon-do. It includes rock- and fossil-related geosites, such as stromatolites; Jurassic conglomerate and Gumunso Pond; karst-related geosites, such as Gossi Cave and Hwaam Cave; and river- and wetland-related geosites, such as Yoseonam Pothole and Cheongryeongpo, with a total of 21 geosites.

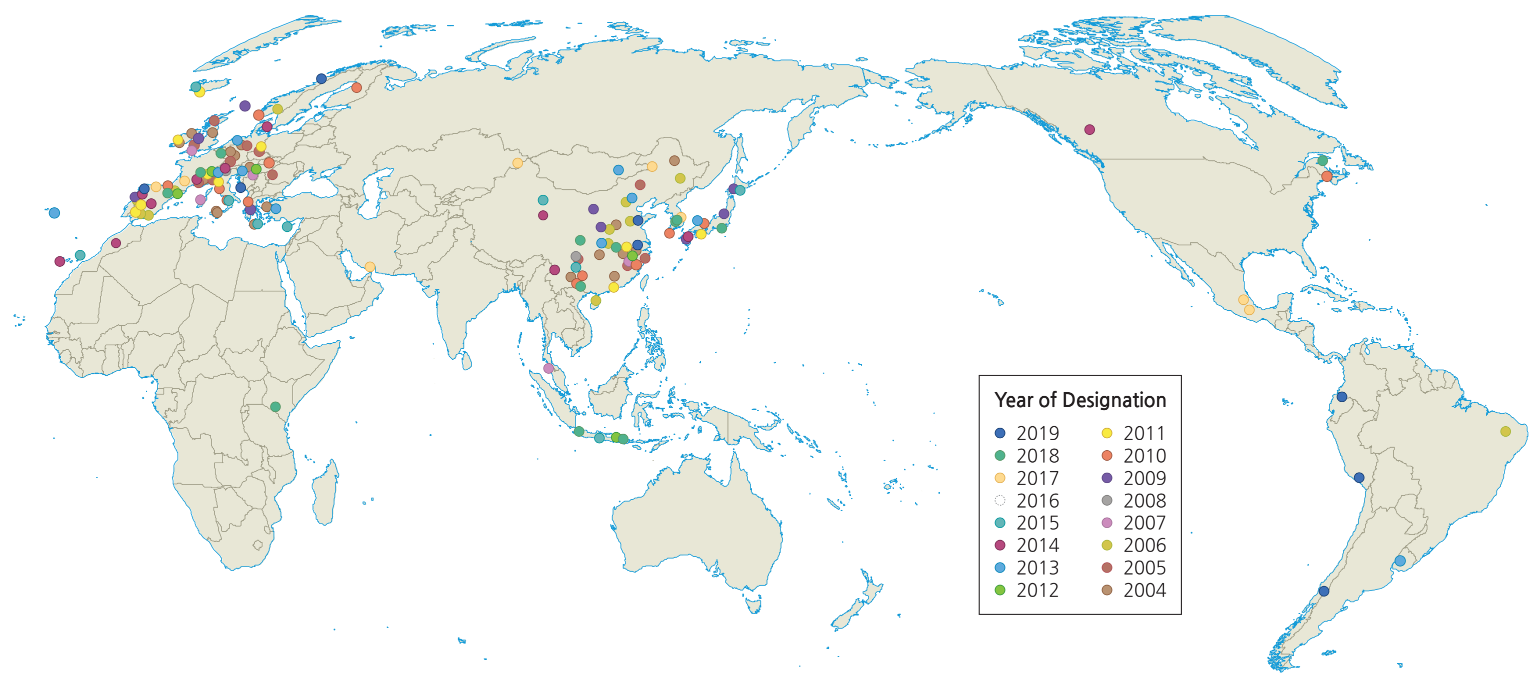
The west coast of Jeollabuk-do, located in Gochang-gun and Buan-gun, has 12 geosites, such as Myeongsasipri, Gusipo, Soyosan, Chaseokgang, Jeokbyeokgang, and Jikso Waterfall.

Gyeongsangbuk-do Donghaean is located in Uljin-gun, Yeongdeok-gun, Pohang-si, and Gyeongju-si along the East coast and has 19 geosites, including Deokgu Valley and Seokryu Cave in Uljin-gun; Goraebul Beach and Jukdosan sedimentary rock in Yeongdeok-gun; Daljeonri columnar joint in Pohang-si; and Yangnam columnar joint in Gyeongju-si.

Baengnyeong and Daecheong include Baengnyeongdo, Daecheongdo, and Socheongdo. Geosites in Baengnyeongdo are Dumujin and Sagot Beach. Geosites, such as Okjukdong Coastal Dune, Geomeunnang, and stromatolites, are located in Daecheongdo and Socheongdo.

10 geosites are located in Jinan-gun and Muju-gun, Jeollabuk-do, such as Osanri orbicular granitic gneiss, UnilamBanilam, Yongchu Waterfall, and Jeoksangsan Cheonil Waterfall.

Global Distribution of Geoparks



Global Geoparks Network (2020), UNESCO (2020)