*Reforestation in Korea*

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**Introduction**

On the way to their current wealthy industrial economy, almost all developed countries underwent progressive deforestation in the 16th-20th centuries. A number of examples can be found in the West, e.g. the territories of modern Greece, Italy, Spain, the Netherlands, Great Britain, France, Germany, Russia, the USA and other countries, as well as in the East, e.g. China and Japan.[[1]](#footnote-1) However, there is one example, the Republic of Korea, where reforestation, the opposite of deforestation, has led to economic growth after a colonial period followed by the devastating Korean War.

During human history, from the earliest times forestlands were cleared for farming and cattle grazing, setting infrastructure (roads, canals), communities development and manufacturing (industries) buildings. The process of deforestation was irreversible, as no forests were planted back on the cleared lands. Timber from cleared forestlands were used mainly as material for civil constructions (houses, plants, mining, wind and water mills, bridges, churches, etc.), fortifications and shipbuilding, which reflected growing mobility for trade or conquest. Timber for furniture, utensils, and other goods comprised the minor volume of timber harvested, while the major volumes were used as a source of energy – firewood for home heating and cooking, fuel-wood and charcoal for iron making or potassium production for manufacturing, then later for steamers and steam trains, and other steam engines in a variety of enterprises.[[2]](#footnote-2) The less forestland left in a country, the higher the prices for timber and firewood in the markets. When coal was introduced as a substitute for firewood, most of the valuable forests were already gone in the economically advanced European countries. An expression used for the shortage in timber supply by some people was “timber crisis” or “national crisis.”[[3]](#footnote-3)

The term “national crisis” was rather an exaggeration of the situation from several points of view, major among them being the following. As a renewable resource, forest can self-regenerate or could be regenerated artificially by humans, who can also support the natural regeneration process. Local shortages of timber were not that dangerous compared to the hidden or invisible (to ordinary people) forest decline and destruction when a forest loses its quality. The quality of a forest lies in its species composition, density, age (the bigger the trees the better), etc. For that reason, the most valuable tree species are harvested (legally or illegally) for sale first. Selective harvesting of big trees without regeneration of similar quality tree species reduces the superiority of future generations of such species and a forest as a whole. Dramatic problems arose in mountainous regions when denudation of lands increased the risks of surface water runoff, landslides, avalanches and other natural disasters, including floods or drought.[[4]](#footnote-4) More problems arise during warfare or accidental incidents, when wooden constructions are burnt to ashes. For example, in Moscow, Russia, since ancient times there was a special place where people could buy ready-to-go wooden houses, barns or chapels.[[5]](#footnote-5)

Comparatively to the West, the Oriental world has followed its own way of development. For example, Japan had similar and different situations at the same time. A similarity with Europe was the level of deforestation due to population growth and increased demand for timber for ceramics production and iron smelting. The difference was that Japan received salt via seawater evaporation, requiring much energy, as well as being limited for economic growth due to the natural boundaries of the country, as an island state, and mountainous terrains where people had already occupied all vacant lands for growing rice and cattle. Later, the green areas used for raising cattle were replaced by settlements, and the people’s diet changed to more fish consumption. On the other hand, this change required more timber consumption for boats, shipbuilding. Thus, deforestation in Japan continued.

The growing wealth of certain families in Japan brought a new problem – a desire to leave something for the future generations, “when considering the forest used to satisfy the egos and ambitions of the ruling elites. They indulge in an almost peculiarly Japanese passion for grandiose and monumental building projects that consumed vast quantities of prime timber and that had few counterparts other than in, perhaps, Imperial Rome, although the latter built predominantly in stone and brick”.[[6]](#footnote-6) Another trouble for the forests was almost non-stop conflicts and wars of regional military and feudal lords with each other. For this fighting, many *daimyos* were built. They are “wooden defensive regional fortresses with barracks, watchtowers, gates, and residences that often became the nuclei of urban settlements.”[[7]](#footnote-7)

Over time, such forest overuse and other land use changes almost laid waste to the territory of Japan. A Confucian scholar Kumazawa Banzan harshly criticized this nonessential deforestation, saying that “eight out of ten mountains in this nation are deforested.”[[8]](#footnote-8) Later on, when there was almost nothing left to harvest, Japanese society awoke, and the country initiated forest preservation and conservation. To cover timber shortages during the industrialization of the economy, Japan turned towards the neighboring China and Korea. The last quarter of the 19th into the beginning of the 20th century became a period when wars and the colonization of Manchuria and the Korean Peninsula began.[[9]](#footnote-9)

**Pre-colonial times**

At that time, the whole Korean peninsula was a forested region, especially in the north. Due to the mountainous relief, temperate climate and sparse population, forests there were diverse, and wildlife rich. One of the most prominent travelers and researchers, Isabella Lucy Bird (Bishop), who actually “disclosed” Japan and Korea to Western readers by publishing a book after each of her journeys, named different native species of trees of the Korean Peninsula in her famous *Korea and her Neighbours*, first published in 1898. For pre-colonial Korea, she named over 40 different aboriginal tree species, e.g., “the *Abies excelsa, Abies microsperma, Pinus sinensis, Pinus pinea*, three species of oak, the lime, ash, birch, five species of maple, the *Acanthopanax ricinifolia, Rhus semipinnata, Elaeagnus*, juniper, mountain ash, hazel, *Thuja Orientalis* (?), willow, *Sophora Japonica* (?), hornbeam, plum, peach, *Euonymus alatus*, etc.”[[10]](#footnote-10) In the following chapters, she named a *Platanus*, juniper, mountain ash,[[11]](#footnote-11) plums, pears, cherries,[[12]](#footnote-12) Spanish chestnut, weeping lime, magnolia,[[13]](#footnote-13) *Pinus sylvestris*,[[14]](#footnote-14) “magnificent zelkawas”[[15]](#footnote-15) and other tree species.

She also mentioned that the Korean flora is rich and interesting, but lacking bright colors. She named such species as the azalea and rhododendron, a few species of clematis, the *millefleur* rose, and the Boston Ivy (*Ampelopsis Veitchi*). Other plants had almost no economic value, except of the ginseng (*Panax quinquefolia*), the wild roots of which were priced at about $15 per ounce. “The fauna of Korea is considerable, and includes tigers and leopards in great numbers, bears, antelopes, at least seven species of deer, foxes, beavers… Among birds there are black eagles, found even near Seoul, harriers, peregrines (largely used for hawking), pheasants, swans, geese, …” and numerous other birds.[[16]](#footnote-16)

Her description of deforestation around Seoul city is of interest. “The denudation of the hills in the neighborhood of Seoul, the coasts, the treaty ports,[[17]](#footnote-17) and main roads, is impressive, and helps to give a very unfavorable idea of the country. It is to the dead alone that the preservation of anything deserving the name of timber in much of southern Korea is owing. But in the mountains of the northern and eastern provinces, and specially among those which enclose the sources of the Tu-men, the Am-nok, the Tai-dong, and the Han, there are very considerable forests, on which up to this time the woodcutter has made little apparent impression, though a good deal of timber is annually rafted down these rivers”.[[18]](#footnote-18) This timber was used in Seoul, as well as providing a large proportion of the firewood and charcoal.[[19]](#footnote-19)

Meanwhile, the hills along the road between Chemulpo and Seoul were forested both with coniferous and deciduous species, while those along the Han River above Tan-yang was not that forested, but good forest covered the Paik-yang Gang area including Tan-pa Ryong. About a half of the area was covered with forests in the Geum-gang-san (the Diamond Mountain) area. Here, Chang-an-sa and Yu-cheom-sa temples were surrounded by “an elongated mass of serrated, jagged, and inaccessible peaks, and magnificent primeval forest, occupying an area of about 32 miles in length by 22 in breadth”[[20]](#footnote-20) that starts at 39 parallel of latitude in the Gang-won province. These forests were also “tiger-haunted forests.” The road to the sea-level at Chyung-Tai was sparsely populated and heavily forested, while some areas were “cleared for the planting of cotton.” A forest near Chyung-Tai was “a Royal reservation, made so by the first king of this dynasty, who built stone walls round the larger trees.” The road from Chang-an Sa to Won-San is described as well forested with presence of tigers and leopards.[[21]](#footnote-21)

At that time, Manchuria, a neighbor of Northern Korea, occupied about 380 thousand square miles with a population between 18 and 20 million. It was quite well forested, as agriculture was much more difficult there.[[22]](#footnote-22) That area and further east around Vladivostok in Russia was heavily forested with a dominance of valuable oak and pine species, providing a habitat for numerous tigers. The construction of the Trans-Siberian Railway and the development of Vladivostok severely denuded this region,[[23]](#footnote-23) while the 1000 miles of shores along the navigable Amur River were well covered with forests.[[24]](#footnote-24)

Timber has long been used in Korea for numerous purposes, starting from the plow to tables and gorgeous cabinets and simple wooden utensils. As well, much timber was used in Seoul for housebuilding, guest and tea-houses, shrines, boats and bridges, charcoal production, salt evaporation, iron making, and many other purposes. Woodcutters, woodworkers or charcoal-burners professions were very common. Fuel-wood collection was allowed to everybody, and due to the heavy demand on forests for different businesses, the forests near villages had already been largely destroyed. Thus, “the road by which we travelled is the main one from Seoul to the eastern treaty port of Won-san. It passes through rice valleys with abundant irrigation, and along the sides of bare hills.”[[25]](#footnote-25)

Describing one of forty-five the Keum-kang San monasteries, Mrs. Bird displayed how the monks worked in forests. “The first impression of the plateau was that it was a wood-yard on a large scale. Great logs and piles of planks were heaped under the stately pines and under a superb *Salisburia adiantifolia*, 17 feet in girth; 40 carpenters were sawing, planing, and hammering, and 40 or 50 labourers were hauling in logs to the music of a wild chant, for mendicant effort had been resorted to energetically, with the result that the great temple was undergoing repairs, almost amounting to a reconstruction.”[[26]](#footnote-26)

Forests belonged to the government, but were open to the public. The major agency for forest control, management and administration was the Ministry of Agriculture, Trade, and Industry, in which, the Bureau of Agriculture was in charge for Agricultural, Forest, and Natural Products affairs.[[27]](#footnote-27) Government forest policy was to protect mainly pine woodlands for governmental needs in timber.[[28]](#footnote-28)

**Colonial period & Korean War**

After the Ulsa Treaty (1905), the Japanese Government established a Forestry Office in its Residency-General in Korea (1907), enacted the Forest Law (1908), and after annexation of Korea in 1910, the occupational government enacted the Chosun Forest Policy Plan and began its full-scale implementation. In 1910, the country’s total volume of growing timber was over 715 million m3, mostly in the northern part of the Peninsula, where, according to the plan, about 69.5 million m3 of wood from 5.31 million ha of national forests were be harvested during a 30-year period.[[29]](#footnote-29) The major goal was to maximize the revenue because reforestation, as it was planned, should go via natural forest regeneration, which would cost almost nothing in forest management.

The primary target for wood production from national forestlands was the 2.18 million ha of forests located in Manchuria, e.g., the Yalu-Tumen[[30]](#footnote-30) watershed covered with pine, oak, ash and other forests of valuable tree species. In 1910, growing stock (timber volume per hectare) here was about 200 m3/ha, with the average 42 m3/ha nationwide. By 1938, the average growing stock in the state forests had fallen to 20.5 m3/ha while in private and common (village) forests it was 10.5 m3/ha.[[31]](#footnote-31)

In 1939, Korean forestland comprised about 16 million ha including 11.4 million ha of stocked or dense forests, which covered more than a half of the Peninsula. One-third of all forests belonged to imperial Japan, or the occupational government.[[32]](#footnote-32) By 1942, the total growing stock of the Korean forests had decreased from 715 million m3 to 224 million m3, comprising less than one-third of that before occupation.[[33]](#footnote-33)

Timber harvested in the Korean Peninsula was shipped to Japan for domestic use: construction, military purposes, and as fuelwood. By following the Occupation Plan, large-scale deforestation in pine forests occurred. In Manchuria, the most valuable Korean pine (*Pinus koraiensis*) while in costal Uljin (울진[군](http://en.wiktionary.org/wiki/%EA%B5%B0)) and Bonghwa ([봉](http://en.wiktionary.org/wiki/%EB%B4%89)[화](http://en.wiktionary.org/wiki/%ED%99%94)[군](http://en.wiktionary.org/wiki/%EA%B5%B0)) counties all kind of pines and other valuable tree species were harvested. People cut trees and collected deadwood mostly for fuel.[[34]](#footnote-34)

Massive clear-cuts occurred also in the southern part of the country. This destruction led to an enormous lowering of forest cover, both forest area and forest quality declined. The Korea Forest Service estimates that in 1950 the growing stock comprised only 6 m3/ha.[[35]](#footnote-35) Such a decline was a result of clear-cuts for fuelwood and slash-and-burn agriculture under the colonial regime. Between 1916 and 1942, the areas of destroyed woodlands increased from 81.7 thousand ha to 374.2 thousand ha with a follow-up downturn from 63.4 thousand has in 1973 to only 455 ha in 1979.[[36]](#footnote-36)

During the Korean War the remaining forests were brutally damaged by bombing, wild fires, and overuse. Substantial amounts of timber were used as fuelwood for heating and cooking. Having almost no other sources of energy, this led to over-cutting and illegal logging in the long run.

After liberation, fertility in the country grew, and the total population increased by 25%. Furthermore, after the Korean War, about 5.5 million people came back to South Korea from other countries. Growing population led to dramatic shortages in food and fuelwood. Forest-land conversion into farm-land (slash-and-burn) for food production as well as timber harvesting for houses and infrastructure exaggerated the deforestation. The Korean Peninsula, having lost a large part of its remaining forests, experienced almost annually more severe landslides, floods, and soil erosion.

On April 5, 1949, Arbor Day (식목일, Sikmogil),[[37]](#footnote-37) was established to rehabilitate deprived lands and to enlighten citizens about the importance of forests.[[38]](#footnote-38)

President Syng-man Rhee (1875-1965)[[39]](#footnote-39) made further attempts to recuperate the situation. During 1948-1960, different plans were developed for reforestation, erosion control, soil conservation, fuelwood forests, etc. Some 2.8 billion trees were planted, and over 1 million ha reforested,[[40]](#footnote-40) but forest cover rehabilitation failed due to many reasons. Main causes were lack of knowledge and organizational skills, poor technologies, insufficient treatment and protection of newly established forests, lack of governmental will and, hence, poor financial support of reforestation activities.

**Dramatic success under President Park Chung-hee**

After the *coup d’etat* of May 16, 1961, General Park Chun-hee (1917-1979) proclaimed his desire for an immediate eradication of five major social evils, drugs, gangsterism, trafficking, financial falsification, and illegal logging. Gaining power as an elected President, during next few years, he endorsed major forest-related regulations. Among the principal acts were the Forest products regulation and Forest law (1961), the Erosion control and National poplar planting movement[[41]](#footnote-41) (1962), Forest reclamation (1963), Fuelwood plantations (1967), Chestnut tree plantations (1968)[[42]](#footnote-42) and others.

With the establishment of the Forest Service and introduction of the National Parks (1967), forest protection, rehabilitation and management received administrative order and planning system as well as conservation and recreation arrangements in Korea.

On April 22, 1970, President Park Chung-hee initiated a complex threefold program on reforestation, food security and poverty reduction as the New Community Movement (Saemaul Undong, [새](http://en.wiktionary.org/wiki/%EC%83%88)[마](http://en.wiktionary.org/wiki/%EB%A7%88)[을](http://en.wiktionary.org/wiki/%EC%9D%84) [운](http://en.wiktionary.org/wiki/%EC%9A%B4)[동](http://en.wiktionary.org/wiki/%EB%8F%99)). One of the most valuable outputs of this political initiative was a modernization of the rural economy based on the traditional ideas of equality, self-governance and self-support of people.[[43]](#footnote-43)

This Movement became the major driving force for the national reforestation and erosion control projects. Women’s clubs, schools, military, villagers, and many other social groups were involved in the Movement, inspired by the national enthusiasm to build a self-reliant and cooperative society. The Korea Forest Service settled the reforestation strategy as well as the First 10-year forest development plan (1973-1982), which was fully implemented within 6 years. About two billion trees were planted, and some 1 million ha of bare lands were reforested.[[44]](#footnote-44)

 During 1970–1979, Korea’s average farm household income jumped from $825 to $4,602,[[45]](#footnote-45) setting a milestone in poverty reduction. The spirit of “Diligence, Self-help and Cooperation”[[46]](#footnote-46) spread widely among the rural population. The movement laid the foundation for Korea to grow into a major economy from one of the world’s poorest countries. The experience of the Korean people in this process is a valuable asset for humankind. Between 1970 and 2011, some 53,000 public officials and village leaders from 129 nations visited Korea to learn about the Saemaul Undong.”[[47]](#footnote-47) In 1965, some 40.9% of the Koreans suffered from poverty, while by 2007 this figure had decreased by almost 4 times to 10.9%.[[48]](#footnote-48)

The success story of South Korea reforestation has received international recognition. The 1982 UN FAO Report stated: “Korea is the only developing country that has succeeded in reforestation after the Second World War.”[[49]](#footnote-49) Later, Lester Brown mentioned in his famous book: “South Korea is in many ways a reforestation model for the rest of the world. When the Korean War ended, half a century ago, the mountainous country was largely deforested. Beginning around 1960, under the dedicated leadership of President Park Chung Hee, the South Korean government launched a national reforestation effort. Relying on the creation of village cooperatives, hundreds of thousands of people were mobilized to dig trenches and to create terraces for supporting trees on barren mountains. South Korea not only reclaimed denuded areas, it also supported the effort with the establishment of fuelwood forests. Se-Kyung Chong, researcher at the Korea Forest Research Institute, writes, ‘The result was a seemingly miraculous rebirth of forests from barren land.’”[[50]](#footnote-50)

The results of reforestation in South Korea can be summarized as follows:

* By 2008, the Republic of Korea had planted around 11 billion trees.
* Between 1953 and 2007, forest cover of the country increased from 35 to 64 percent.
* From 1961 to 1995, successful reforestation allowed an increase of forest area from 4 million ha to 6.4 million ha.
* Between 1960 and 2010, growing stock increased from 9.6 to 125.6 m3/ha.
* Self-sufficiency of timber consumption increased from 9.2% in 2006 to 16.2% in 2012.
* In 2007, public benefits were valued at US$60 billion.[[51]](#footnote-51)

Reforestation activities made the southern part of the Peninsula (the Republic of Korea) green and prosperous. Meanwhile, recent research shows that deforestation in the northern part of the land (the DPRK) has led to an increasing level of precipitation in the south, especially during summertime. The precipitation patterns were investigated for the period from 1973 to 2005 by analyzing data from all the meteorological stations in South Korea.[[52]](#footnote-52) Later on, the opposite trends in summer precipitation in North and South Korea were further confirmed by using four global and regional satellite and rain gauge datasets.[[53]](#footnote-53) On one hand, the increase of annual precipitation is likely to increase the risks of flood and drought. On the other hand, it also “means that the increase of annual precipitation should not be helpful for water resources management but could be a burden to river management and dam operation in Korea.”[[54]](#footnote-54)

**Current Efforts in the DPRK**

Problems with deforestation in North Korea arose in the early 1990s. The last quarter of the 20th century has seen dramatic changes in the global political landscape after the disintegration of the Soviet Union and the demise of East-European bloc of countries in 1991. As well, significant changes on the political map have occurred in Asia, where the People’s Republic of China established diplomatic relations with the Republic of Korea in 1992. In such developments, the Democratic People’s Republic of Korea found itself in difficult circumstances because its two big neighbors, Russia and China, almost completely terminated their support of DPRK in energy, agriculture and military spheres. Floods and droughts in North Korea became almost annual disasters.[[55]](#footnote-55)

The DPRK energy consumption dramatically changed after 1991, when massive oil provisions from the USSR were terminated. Coal and coke still provided major energy to the DPRK military and civil sector, while the wood/biomass share in energy significantly increased and comprised about 1/3 of total energy demand.[[56]](#footnote-56) Indeed, as the DPRK has reported,[[57]](#footnote-57) the country’s forest area decreased from 8.2 million ha in 1990 to 5.7 million ha in 2010, e.g., forest cover declined from 68% to 47% of total land area. These figures show that the deforestation rate in the country during those 20 years was 127,000 ha/year land conversion for agricultural lands and timber harvesting mostly for fuel. Due to high demand for energy, dramatic changes occurred in the total volume of forests: a decrease from 504 million m3 in 1990 to 360 million m3 in 2010, or 28%. Fuelwood consumption for this 20-year period increased from 5.1 million m3 to 6.6 million m3.An assessment of forest cover in South and North Korea from 1980 to 2010 shows dynamic changes in both countries due to urbanization, regrowth in abandoned fields in South Korea, as well as decline of dense forests in North Korea.[[58]](#footnote-58)

The DPRK economy is vulnerable to natural disaster because the share of agriculture, forestry and fishery sectors in the industrial structure of the country comprises more than 20%, while in the Republic of Korea the figure is less than 3%.[[59]](#footnote-59) Thus, deforestation and land use change causing floods create risks for people’s wellbeing. For example, “devastating floods and consequent droughts from 1993-1998 reduced agricultural production from 9.0 million tons of cereals in 1993 to less than three million tons in 1996; from 2000 this has slightly increased to about 4.5 million tons annually”.[[60]](#footnote-60)

Strategic reforestation programs have become a key priority for the DPRK government.[[61]](#footnote-61) The country has the legislative base in place, all forests are in state ownership, and tree nurseries can produce enough planting materials for massive reforestation.[[62]](#footnote-62)

The country also participates in a few international forest-related projects. Main tasks in the DPRK general forestation program are divided into 10-year periods. The first period is a forest recovery stage, during which model units will be established and expanded in number; during the next stage forest recovery will reach completion, and then forest resources will undergo expansion.

Critical areas for aid and assistance are:

* Information (need of database-creation for land use, forest activities, biodiversity);
* SFM policies (lack of policies and legislation on forest use, planning and management);
* Knowledge-sharing (lack of clear understanding of land value, causes and consequences of forest and land degradation);
* Financial aid;
* Capacity building.

Potential for cooperation with the DPRK for further development exists in various areas and forms. A major pattern for land reforestation is the South Korean New Village (Community) Movement, which is recognized by the international community, and brought success to local people from economic, social, and environmental points of view. There might be other projects linking historical, cultural, traditional and linguistic common features of North and South Korea, such as collaborative work on the Baekdudaegan mountain range[[63]](#footnote-63) or creation of a Peace Park in the Demilitarized zone (DMZ).[[64]](#footnote-64)

There is much potential in other development projects. Among them are the Tumen River Area Development Program (TRADP) known since 2005 as the Greater Tumen Initiative (GTI)[[65]](#footnote-65); a trans-Korean railway allowing a twice-faster delivery of goods between Western Europe and the northern part of the Pacific Rim Region;[[66]](#footnote-66) an integrated electric power system[[67]](#footnote-67) and others, but this is a topic for a different study.

**Conclusion**

The historical development of the Korean peninsula is subject to permanent challenges due to political, economic, and environmental circumstances. The political environment is currently very sensitive, but extremely important for further development in this region. Severe deforestation and the following successful reforestation in South Korea is well known. Energy and food problems causing deforestation in North Korea can threaten South Korea weather, especially the precipitation pattern, that might potentially create disastrous events in South Korea. Forest is a renewable resource, and deforestation is reversible; thus, reforestation is one of the most efficient methods to resolve environmental and economic problems in North Korea. In the DPRK, the significance of reforestation should be promoted at all levels of governance and management, bearing in mind that the establishment of real international partnerships at all levels is critical for the DPRK’s reforestation and economic growth. RoK’s success story is internationally recognized and can be used in DPRK as a pattern, especially, the Saemaul Undong (the New Village Movement).

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15. Bird, ibid, V.1, pp. 196. Zelkova (correct modern name) is an Asian tree of the elm family, often cultivated for its wood as an ornamental or as a bonsai tree. [↑](#footnote-ref-15)
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