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THE RESTORATION DIAGNOSTIC

Case Example: South Korea

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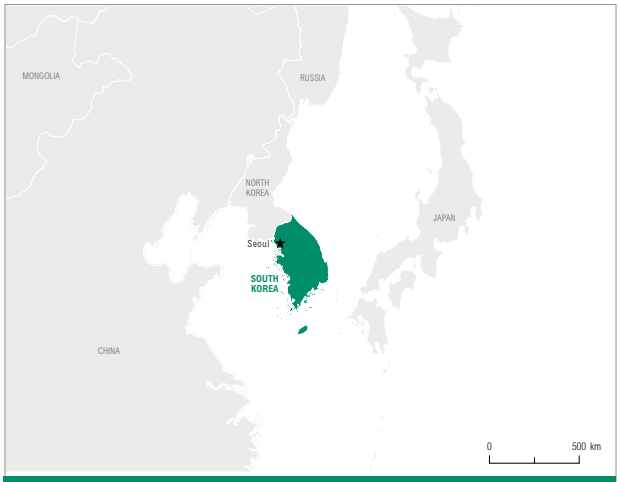
CASE EXAMPLE: SOUTH KOREA

SUMMARY

Within the context of continuous conflict and war, the forests of South Korea were severely depleted and degraded during the first half of the 20th century. The period of Japanese occupation (1910–1945) and World War II (1939–1945) resulted in excessive harvesting of wood for timber and fuel from South Korea's forests. The Korean War (1950–1953) triggered even more forest loss and degradation. By 1952, the nation's forest growing stocks were less than 50 percent of pre-war levels (Lee 2013).

Since the mid-1950s, however, South Korea has restored much of its forest area. The nation's forest cover increased from approximately 3.5 million hectares from the mid-1950s to 6.4 million hectares in 2007, nearly a 3 million hectare gain. Correspondingly, forest cover grew from 35 percent to 64 percent of the country's total land area in the same time frame (Bae et al. 2012). Forests not only increased in area, but also increased in growing stocks—the density of trees or wood biomass per hectare (Table 1). Furthermore, the restored forests have provided many valuable ecosystem services. As of 2013, the estimated monetary value of these benefits was more than US$92 billion, which is equivalent to approximately 9 percent of the country's Gross Domestic Product (GDP) (Table 2).



TIME PERIOD: 1950s to present

AREA RESTORED: Approximately 3 million hectares, nearly 30 percent of the country's land area

TYPE OF RESTORATION: Primarily active restoration


SOUTH KOREA BEFORE


SOUTH KOREA AFTER

WHICH FEATURES AND KEY SUCCESS FACTORS WERE EXHIBITED?

The South Korean experience exhibited a number of the features and key success factors of forest landscape restoration.

Motivate

The government and landowners became motivated to replant trees and allow natural regeneration in lost and degraded forest areas due to several factors:

- **BENEFITS.** Forest landscape restoration was expected to provide a number of economic, social, and environmental benefits. From an economics perspective, restoring trees was seen in the early days of restoration as a way to meet demand for scarce timber and fuelwood. Socially, Koreans have had a strong historical cultural connection to forests, in particular pine, with stories and traditional handicrafts incorporating trees (Tak et al. 2007). From an environmental perspective, restored trees would curtail erosion and improve water storage capacity. Covering 64 percent of the nation, South Korea's mountainous areas have a water storage capacity of 18 billion tons, approximately 9 times as much as the 1.9 billion ton storage capacity of the Soyang River Dam (Lee 2013). Forests on mountain slopes help sustain this vast water storage capacity.
- **AWARENESS.** The government initiated a nationwide campaign to educate citizens about the benefits restoration would provide and to garner widespread commitment for implementation. For example, accompanying the launch of the First National Forest Plan, the government declared a tree planting period between March 21 and April 20, 1973. In addition, the Korea Forest Service encouraged citizens to participate in the tree planting projects, using posters with the slogan "Let's plant the nation's green hope in the mountain," messages on cigarette packs and postage stamps, and advocacy via radio broadcasts. The government also leveraged national pride with public campaigns utilizing such slogans as "Planting is loving the nation" and "Cutting trees is a menace and planting trees is an act of patriotism" (Bae et al. 2012). Moreover, after the liberation of Korea in 1945, the government declared a national Arbor Day (April 5), which is still celebrated today (Lee 2013).
- **CRISIS EVENTS.** Due in part to loss of forest cover, South Korea experienced severe flooding events, landslides, and regional droughts (KFS 2010). In addition, illegal logging and slash-and-burn agriculture proliferated amid the social disorder during and after the war periods. Furthermore, drastically reduced forest stocks threatened national energy security since firewood and charcoal accounted for a majority of total energy generation by the mid-century (Bae et al. 2012).

Table 1 | **Changes in Tree Growing Stocks**

YEAR	GROWING STOCK LEVEL (M^3/HA)
1960	9.6
1970	10.4
1980	22.2
1990	38.4
2010	125.6

Source: KFS 2010.

Table 2 | **Estimated Monetary Value of Forest Benefits**

BENEFIT	VALUE (USD)
Carbon sequestration and air purification	18.7 billion
Water benefits	22.7 billion
Forest recreation	12.4 billion
Soil erosion prevention	12.2 billion
Landslide prevention	5.6 billion
Biodiversity conservation	6.5 billion
Forest therapy*	1.4 billion
Other benefits**	12.8 billion

Source: KFS 2013.

*Invented in Japan, also known as "forest bathing" (considered a natural form of aromatherapy).
**Reflects the intrinsic benefits of forests and landscapes.

Enable

Many enabling conditions came into place to facilitate restoration of forests in South Korea, namely:

- **ECOLOGICAL CONDITIONS.** At the end of the Korean War, forest areas were so degraded that many areas lacked sufficient source populations that could underpin natural regeneration. In response to this gap, the government put in place a program of seedling nurseries, including 460 well-paid nursery experts, who produced 500 million seedlings per year (Lee 2013).

- **MARKET CONDITIONS**. Since the end of the Korean War, competing demands for alternative uses of degraded forest lands declined. For instance, the use of wood for energy dramatically fell in just 30 years. Whereas wood comprised 90 percent of national energy use in 1950, it comprised just 5 percent in 1980. The use of lost and degraded forest lands for human settlements and small farms declined as well. As the nation industrialized, migration to urban areas led to a decline in the nation's rural population from about 16 million in 1950 to about 3 million by 2000, further relieving pressure on the land and allowing restoration to occur (Bae et al. 2012).

- **POLICY CONDITIONS.** Beginning in 1973, the Korea Forest Service designed a series of multi-year "Forest Development Plans for Rehabilitation and Restoration" that guided restoration with targets, funds, extension, public outreach, and enforcement. Goals of each plan vary and build upon those of its predecessors. For instance, the first plan (1973–78) prioritized restoring vegetation to denuded land to curtail erosion and other problems, the second plan (1979–87) prioritized restoring commercial forests for timber and fuelwood, the third plan (1988–97) emphasized public benefits such as recreation and wildlife protection, the fourth plan (1998–2007) encouraged sustainable forest management, and the fifth plan (2008–17) emphasized the role of forests in green growth and climate change adaptation (Lee 2012). In addition to a national plan, restoration has been aided by the fact that private property rights are relatively clear and secure in South Korea.[1] Approximately 70 percent of the country's total forest area is now in private ownership (FAO 2012).

- **INSTITUTIONAL CONDITIONS.** The national government coordinated the activities of national, provincial, and municipal governments to ensure alignment of policies and activities among them. An early act of coordination came in the mid-1950s, when an interagency effort was established to coordinate the energy policy of the Ministry of Commerce and Industry with the restoration policy of the Ministry of Agriculture and Forestry. Their joint efforts contributed to the market conditions described above. In particular, the Ministry of Commerce and Industry carried out several projects in 1956 to increase the production of coal briquettes as a substitute for firewood and charcoal. In 1958, the Ministry of Agriculture and Forestry banned the inflow of firewood into major cities and established designated fuelwood forests. In 1973, the Korea Forest Service came under the auspices of the Ministry of Internal Affairs—a division of government more capable of providing local governments with financial, administrative, and enforcement support. Another move was to ensure that the first National Forest Plan was synchronized with other policies, including the Economic Development and National Comprehensive Land Development Plans (Bae et al. 2012).

  Traditional culture was leveraged to act as a motivating force to organize people and reinvigorate traditional institutions. A traditional sustainable forest management system—songgye, effectively community forestry (Tak et al. 2007)—formed nearly 300 years ago was reinvigorated.[2] The main role of a songgye as a resource management organization was to provide three important types of public infrastructure: community rules, provision management (fuelwood, etc.), and monitoring of rule compliance and sanctioning of unauthorized activities (Chun and Tak 2009).

Implement

During this time period, capacity and resources for implementation came into place that facilitated restoration, including:

- **LEADERSHIP.** Leadership in visioning and implementing forest landscape restoration came from the highest levels in South Korea. President Park Chung-hee, who served from 1963 to1979, was the first leader to make reforestation a national priority and was a champion of restoration during his tenure. Among other actions, he emphasized in his public addresses that planting trees was an act of patriotism that would make the nation strong. He mandated the planting of 0.5 hectares of fuelwood forest per household and encouraged villages to reestablish community cooperatives to revitalize cooperation and successful forest restoration (Lee 2013).

- **FINANCE AND INCENTIVES.** During the 1950s and 1960s, foreign aid from the United States helped South Korea's economy recover from the war era, and at times accounted for as much as 8 percent of South Korean GDP (Mason 1980). This level of overall economic development assistance created space for the country to provide incentives toward restoration. The government financed forestry experts to provide guidance so that restoration would create income opportunities for rural citizens (Lee 2013). Local government also guaranteed the purchase of seedlings and saplings from village-operated tree nurseries (Bae et al. 2012). In 1976, the World Bank gave a $4.2 million loan over a 25-year period to support establishing fuelwood forests (Lee 2013).

- **TECHNICAL DESIGN.** The techniques applied follow the goals outlined in the Forest Restoration Plans. Historic restoration encouraged planting of coniferous trees, which now constitute about 57 percent of the restored area. Restoration goals have evolved over time: efforts are now under way to increase the diversity of tree species in the restored forest landscapes for the sake of biodiversity and mitigation of pest and disease risk (FAO 2012).

LOOKING FORWARD

Between 1953 and 2010, South Korea's forest cover increased almost two-fold and tree density increased thirteen-fold, while the country's population doubled and the economy grew twenty-five-fold in real terms.[3] In many respects, restoration in South Korea has been a huge success. Several factors, however, should be noted as caveats:

- **INSTITUTIONAL CONDITIONS.** Whereas South Korea is a democracy, the government was largely authoritarian between 1953 and 1988. This characteristic enabled swift changes in institutional and policy conditions (CBO 1997). It also enabled conditions that abused human rights. For example, the Temporary Act of Forest Reclamation enacted in early 1963 enabled forced unpaid labor in the fuelwood forests. A 1977 report by the CBS News Corporation highlighted corruption and forced labor regarding forest restoration. UN FAO inspections in the 1980s led to such practices being diminished through a fear of exposure. In addition, the rise of more robust democratic practices led to more accountability and citizen participation (Lee 2013).

- **TECHNICAL DESIGN.** To create rapid restoration and produce economically viable forests, government policy focused on planting coniferous forests. Due to this, the tree age structure in many South Korean forests is not yet varied. The lack of species diversity and age structure has led to increased susceptibility to pest and disease outbreaks in recent years (FAO 2012). Moreover, *Pinus rigida*[4] is a native species of eastern North America, and does not grow as well in Korea; the dense needles do not decompose well and also block water from penetrating the soil (Tak et al. 2007). Mature forests—over 60 years of age—are rare. In order to combat this risk, efforts are under way to increase non-coniferous forest area and enhance species diversity (FAO 2012), such as planting a range of pine species, oak and non-timber forest products such as chestnuts, pine nuts, jujubes, and walnuts (Tak et al. 2007). Such efforts, coupled with more designated protected areas, are projected to have positive impacts on biodiversity (FAO 2012), which will need to be the focus in the next stage of South Korea's restoration plan (Tak et al. 2007).

  Currently around 84 percent of South Korea's wood needs are supplied by imports (KFS 2013). Korea is among the major destinations for timber exports from countries most badly affected by illegal logging. Despite its designation as the world's fifth largest consumer of illegally sourced wood (after China, Japan, the United States, and the EU), there has been almost no domestic or international attention paid to South Korea's role as a consumer of illegal wood, limited campaigning work by nongovernmental organizations, either domestically or internationally, and limited coverage in the local or international media (Lawson 2014). Commercial timber production has been and still is the central goal of the Korea Forest Service since its inception in 1967 (Tak et al. 2007); however, this is yet to be realized.[5]

- **MARKET CONDITIONS.** Population pressure is a challenge that has to be managed in restoration efforts. For example, between 1970 and 2005 the forest area declined by 218,000 hectares.[6] Rapid economic growth along with industrialization and urbanization led to increased demand for land for housing, factories, and roads. To meet these increased demands, forest lands were converted to other land uses (FAO 2012).

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ENDNOTES

1. Traditionally, all land belonged to the king and was granted by him to his subjects. The Japanese conducted a comprehensive land survey between 1910 and 1920 in order to place landownership on a modern legal footing. Farmers whose families had tilled the same soil for generations but could not prove ownership in a way satisfactory to the colonial authorities had their land confiscated. Land reform was carried out by the United States and South Korean authorities between 1945 and 1950. The institution of private property was retained, but the American occupation authorities confiscated and redistributed all land held by the Japanese colonial government, Japanese companies, and individual Japanese colonists. The Korean government carried out a reform whereby Koreans with large landholdings were obliged to divest most of their land. A new class of independent, family proprietors was created (Savada and Shaw 1990).

2. Although the tradition was brought to an end by the war, it is still remembered in the cultural and institutional memory of the rural community. When Korea needed the tradition in the late-1960s, it was brought back to life to play a critical role in the success of reforestation. Songgye was originally an organization to protect local forests, but its tradition became a powerful organization to rehabilitate the denuded Korean landscape in the 1960s (Chun and Tak 2009).

3. GDP data for 1960 (earliest year available) and 2010 is from the World Bank (n.d.), calibrated to 2005 in constant U.S. dollars. World DataBank. Available at:<http://databank.worldbank.org/ddp/home.do>. [Accessed August 1, 2014.]

4. *Pinus rigida* is a major tree species used in restoration. It was the fourth most populous species of tree in terms of land area in 2007 (Tak 2007).

5. Of the 2.1 million forestland owners, twenty-three do use their forests for commercial timber production. For the most part, trees throughout Korea are still too small for saw log production, and the poor wood quality of both native species and non-native species limits the range of forest products (Tak et al. 2007).

6. Area declined from 6,612,000 hectares to 6,394,000 hectares.

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