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The Role of Effective Institutional Coordination for Successful Reforestation :

Lessons from the Republic of Korea

Sarwat Chowdhury and Julie Adiwal

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ACRONYMS

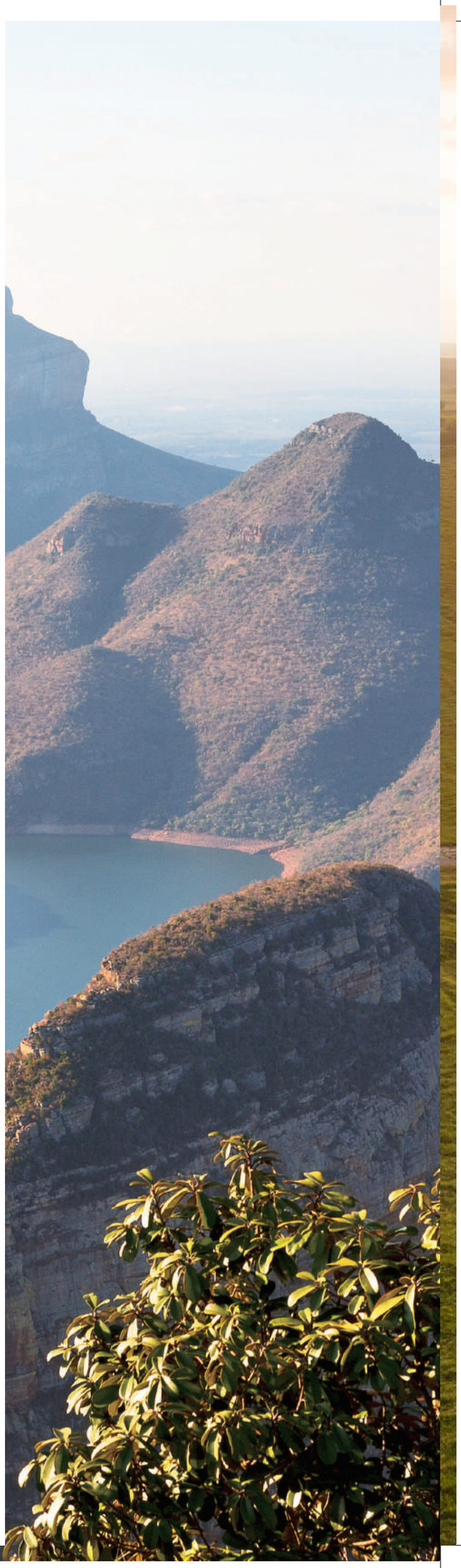
CRNR	College of Renewable Natural Resources
FC	Forestry Commission
FPDC	Forestry Plantation Development Centre
FSD	Forest Service Division
FSI	Forest Sustainability Index
GEPP	Government Expanded Plantation Program
GFW	Global Forest Watch
KFS	Korea Forest Service
LSPCPD	Private Commercial Plantations Development
MAF	Ministry of Agriculture and Forestry
MCI	Ministry of Commerce and Industry
MHA	Ministry of Home Affairs
MIA	Ministry of Interior Affairs
MoLF	Ministry of Lands and Forestry
MTS	Modified Taungya System
NFPDP	National Forest Plantation Development Program
NIFoS	National Institute of Forest Science
NLPG	National Liquefied Petroleum Gas
NRMP	Natural Resources Management Programme
RMSC	Resource Management Support Centre
SADA	Savanna Accelerated Development Authority
SFM	Sustainable Forest Management
UNDP	United Nations Development Programme
UNKRA	United Nations Korean Reconstruction Agency

EXECUTIVE SUMMARY

The Republic of Korea experienced an extraordinary forest transition, it is one of only four countries and the only former developing country, to succeed in rehabilitating its forests following World War ll. Despite massive devastation across forests, the country successfully transformed denuded lands into rich forests in less than half a century. Korea's successful forest rehabilitation can be attributed to a variety of factors, including, robust political commitment, strong institutional capacity, an integrated policy approach and community involvement. This paper focuses on Korea's approach to reforestation, specifically, ministry-level coordination and collaboration. The paper explores, the effectiveness of a comprehensively integrated policy approach that has both horizontal and vertical components; and has detailed, concrete objectives and delineates clear responsibilities for a variety of stakeholders. Among many advantages of an integrated approach is that it allows ministries to use their comparative advantage to contribute to larger policy objectives. Furthermore, the Korean case demonstrates that community participation and public awareness can create an environment conducive to successful policy implementation as communities protect forests, plant trees and support sustainable forest management activities.

This paper also presents a comparative case study between Korea and Ghana. Ghana approached reforestation with a similar strategy as Korea, with coordinated national forestation plans and integrated policies. However, there are some key differences including degrees of integration and implementation methods adopted by the two countries. These similarities and differences allow for a suitable comparison that can help policy makers better understand the complexities involved in the implementation of successful forest rehabilitation policies.

While the Korean experience was unique for its time, it offers lessons on institutional coordination mechanisms that seems to have produced results in that specific context. Among other factors, Korea's case demonstrates the importance of a holistic approach for successful reforestation, especially the importance of coordination among stakeholders at every level. Countries formulating forestry policies and reforestation activities can therefore utilize this experience particularly, in terms of the importance of how policy is structured from the onset.



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The Role of Effective Institutional Coordination for Successful Reforestation: Lessons from the Republic of Korea

Sarwat Chowdhury and Julie Adiwal

1. Introduction

Forests protect biodiversity, regulate ecosystems, play an integral role in the carbon cycle, and are significant for disaster mitigation. They also support livelihoods, provide food security, and help drive sustainable growth. Yet, every year approximately 12 million hectares of forest are destroyed. Deforestation, due to agriculture and other land use activities, is responsible for roughly 25 percent of global greenhouse gas emissions. According to experts, by eliminating emissions from deforestation and increasing carbon removals through reforestation and landscape restoration, global net emissions could be reduced by 30 percent (UN Environment, 2019). Hence, reforestation is one of the most effective tools available to governments for the fight against climate change. At the government level, successful reforestation requires strong political commitment, institutional capacity, and coordination, along with adequate investment in the forestry sector. Forestry policy requires an approach with a long-term horizon to ensure sustainability. Policy integration is such a possible approach. This requires highest level of collaboration among branches of government and ministerial departments, especially for the design and implementation of a common policy objective in meeting large-scale development challenges. This paper focuses on the effectiveness of forest rehabilitation policies implemented within an integrated policy framework.

The Republic of Korea's (from herein Korea) reforestation effort provides lessons on the effectiveness of policy integration. The government developed clear concrete policy objectives, formulated in its national plans for reforestation. National-level ministries and departments contributed their expertise to these objectives in a coordinated and effective manner. As a result, the government successfully implemented National Forest Plans from 1973 to 1987. During this period, un-stocked forest area decreased by 77%, forest area increased 9%, and the total growing stock increased by 270% (Bae J. S., 2014). Furthermore, approximately 11 billion trees were planted from 1967 to 2008 (Korea Forest Service, 2010). These unprecedented levels of success were fueled by strong political will, effective intra-governmental coordination, departmental restructuring and inclusive forestry approaches.

This paper provides insights into Korean reforestation

policy and successful methodologies for countries working towards forest transition[1]. In terms of structure, this paper begins with summarizing the historical context in Korea, along with the leading causes of deforestation. Second, it describes policy solutions and intra-governmental coordination efforts that took place; for example, the Ministry of Commerce and Industry (MCI), the Ministry of Agriculture and Forestry (MAF) and the Ministry of Home Affairs (MHA) coordinated complementary policies for energy substitution. The positive impact of community engagement and public awareness campaigns on successful reforestation is also discussed.

A comparative case study between Korea and Republic of Ghana (from herein Ghana) is also presented. Ghana approached reforestation with a similar strategy to Korea, with coordinated national forestation plans and integrated policies. However, there are some differences in their approach; for example, Ghana utilized a system of vertical integration, whereas Korea primarily followed a horizontal approach with significant vertical dimensions. These nuances allow for a germane and insightful comparison.

1 The term forest transition refers to a change in forest cover over a given area from a period of net forest area loss to a period of net gain (Deli Zhai, 2017).

2. Defining an Integrative Policy Approach

An integrative policy approach is the process of harmonizing various policies to produce an integrated and coherent policy structure under a single, overarching vision. Policy integration is the highest level of collaboration among stakeholders with different functions in government. It allows for collaboration on structuring and implementing a common policy objective and can be significantly more effective and efficient in comparison to traditional approaches (Park & Youn, 2017). Integrative policy approaches can prevent counterproductive or sub-optimal policy outcomes that arise from treating interrelated policies and components in isolation from one another. It can also counter some of the challenges presented by conflicting interests among ministries, including difficulties with prioritization and budgeting. This approach is expected to generate coherent policy goals, and consistent policy means that produce policy outcomes optimally matched to specific large-scale problem contexts (Rayner & Howlett, 2009).

Policy integration has both horizontal and vertical dimensions. The horizontal dimension refers to coordination and collaboration among the national-level leadership (cabinet and legislature) along with national-level ministries and departments. The vertical dimension refers to the national government's collaboration with actors on different levels of the organizational ladder, including provincial governments, local governments, community leaders, and civil society groups (Rayner & Howlett, 2009). Korea took a comprehensive approach to policy integration and utilized both horizontal and vertical dimensions of policy integration for forest rehabilitation.

Overall, integrative policy strategies can be more challenging to execute compared to traditional policy approaches that have a narrower focus and mandate. This is due to the complexity of policy objectives and difficulties related to large-scale coordination efforts. Sustainable development initiatives and environmental policy formulation can be especially complicated due to a multiplicity of implications and the sheer diversity of stakeholders involved, the latter often with vastly different priorities. Therefore, a comprehensive and systematic approach is required to tackle environmental challenges (Park & Youn, 2017). Policy frameworks need to balance economic, environmental, and social demands of a given country context. Effective policy development requires the synergy of priorities and consensus-building among stakeholders.

It can then be argued that for successful forest rehabilitation, an integrative policy approach is necessary due to the magnitude of the challenge. In fact, Korea's successful reforestation experience highlights the importance of an integrative policy approach. The Korean government developed clear concrete policy objectives, formulated in national plans for reforestation. The government coordinated with various national ministries and departments along with local governments and community leaders for successful implementation. It also focused on the integration of environmental and economic policy objectives. Andoh and Lee argue that Korea utilized a horizontal integration approach in comparison to Ghana, which utilized a vertical approach (Andoh & Lee, 2018). However, this paper argues that Korea utilized an approach that had both horizontal and vertical dimensions and it proved to be an exceptionally effective strategy. The Korean experience demonstrates that government intervention through comprehensive, integrated reforestation policies and programs can be an effective strategy to achieve sustainable forest rehabilitation.

2.1. Historical Context of Korea

The Republic of Korea is one of only four countries[2] and the only former developing country, to succeed in rehabilitating its forests following World War ll.

2 Other countries include Germany, United Kingdom, and New Zealand.

Despite the devastation of Korea's forests, the country successfully transformed bare lands into rich forests in less than half a century (Markandya, Son, & Lee, 2017). Historically, severe deforestation in Korea was caused by a multiplicity of factors. During the Joseon period, there was a troubling level of deforestation due to several wars and the increasing demand for farmland (Korea Forest Service, 2010). This was followed by severe exploitation of natural resources during the Japanese occupation period (1910-1945). Over the colonial period, the growing stock decreased rapidly from 700 million m^3 to 200 million m3 (Korea Forest Service, 2010). Japanese occupation was succeeded by the Korean War (1950-1953), which further devastated forest lands. During this period, almost half of the country's forest land was destroyed, reaching a historic low. Severe deforestation resulted in secondary losses as erosion control facilities were demolished, and heavy rainfall caused serious damage. Furthermore, the Korean War destroyed any remaining manufacturing facilities and infrastructure in the country, leading to extreme poverty and societal unrest. The combination of political instability, ineffective economic policies, and social strife negatively impacted policymaking conditions and the government's ability to implement any policies related to forest rehabilitation during the 1950s and early 1960s.

During the 1950s, deforestation was further exacerbated by slash-and-burn tactics used for agricultural activity. Additionally, scarcity of energy sources resulted in the exploitation of fuelwood to meet household needs such as cooking and heating. A population boom followed the Korean War, increasing pressure on severely limited forest resources. Policymakers realized that to prevent illegal logging, an alternative, inexpensive energy source needed to be rapidly developed and made widely available. Due to Korea's limited endowment of natural resources, policymakers decided that coal was the preferable option to logging as an alternative energy source. Eventually, there was a shift from coal to more expensive fossil fuels such as petroleum and natural gas as they became more affordable. Increased economic wealth also allowed for imported forest products (Markandya, Son, & Lee, 2017). For example, by the late 1980s, approximately 90% of timber was being imported (Bae J. S., 2014). Furthermore, rapid economic growth and rapid urbanization, helped reduce incidents of slash-and-burn agriculture and illegal logging since these activities usually take place in rural areas (Markandya, Son, & Lee, 2017).

From the beginning, the government realized that a challenge of this magnitude required a multifaceted approach with integrated solutions. Policy planning was comprehensive and well-rounded; it included plans for community forestry, forest protection, pest control, and tree planting from the start.

2.2. Overview of the National Plans, Legislation and Main Actors

2.2.1. The Forest Law (1961)

The Forest Law was introduced in 1961 to enhance the protection, management, and utilization practices of forests. It is considered the most important piece of legislation for reforestation efforts in Korea because it became the foundation for all subsequent laws related to forest management. Through this law, efforts to replant trees on national and private lands became institutionalized. This law also recognized the economic benefits of reforestation and responsible forest management. This recognition effectively linked reforestation efforts to the economic development plans, which expressed national priorities (Kim & Son, 2019). The Forest Law prohibited logging and slash-and-burn agriculture without a permit, and completely banned the poaching of trees and fallen leaves (Kim & Son, 2019). It also outlined the development of organizations such as the Forestry Cooperative Association, Forestry Cooperative, and Village Forestry Cooperative. These organizations played an essential role in the mobilization of farmers for forest reclamation in the 1970s (KDI School of Public Policy and Managment, 2012).

2.2.2. National Plans for Development and Reforestation

The National Reforestation Programme in Korea consisted of: the First 5-year Economic Development Plan (1962-1966), the Second 5-year Economic Development Plan (1967-1971), the First 10-year Forest Rehabilitation Plan (1973-1978) and the Second 10-year Forest Rehabilitation Plan (1979-1987). During this time, the National Reforestation Programme was integrated and mainstreamed into multiple government programmes, including the National Comprehensive Development Plan (Bae J. S., 2014). Furthermore, sustainable forest management policies and urban forestry initiatives continued to be reflected in the Third National Forest Plan (1988- 1997), the Fourth National Forest Plan (1998-2007), the Fifth National Forest Plan (2008-2017) and the Sixth National Forest Plan (2018-2027).

2.2.3. The First 5-year Economic Development Plan (1962-1966)

During the 1960s, the Korean government focused on developing an export-oriented economic model focused on heavy industry. The government concentrated on rebuilding the country's infrastructure and developing robust manufacturing, along with heavy and chemical industries. Despite a focus on economic development, this plan addressed issues of erosion control and energy demands in rural areas. To decrease the demand for fuelwood, the government decided to promote a transition from fuelwood to coal for household energy needs. They also banned the import of fuelwood into the densely populated capital area for the same reason. The main driver behind the integration of reforestation activities into economic development plans was the leadership's strong commitment to both. The administration took a long-term perspective towards economic development. They understood the importance of building a strong foundation which among other factors included forest resources to supplement rural incomes (Lee, 2013).

2.2.4. The Second 5-year Economic Development Plan (1967-1971)

The First 5-year Economic Development Plan successfully achieved rapid industrialization. The implementation of anti-fuelwood policies resulted in most urban households replacing fuelwood with anthracite coal[3]. The Second 5-year Economic Development Plan established the Korea Forest Service (KFS) and tasked the organization with forest protection and forest resource development. The establishment of the KFS shifted the focus on forestry policy towards the development of forest industries rather than being focused on protection (Bae J. S., 2014).

Furthermore, the planting of fuelwood plantations continued to secure long-term provisions for rural communities. In 1967, 360,000 ha of fuelwood plantations were planted and an additional 150,000 ha were reforested. By 1972, there was a total of 440,000 ha of fuelwood forests (Bae J. S., 2014). These trees were planted and tended to by local communities and the profits were divided between forest owners (20%) and rural forest workers (80%). These policies allowed for reforestation while simultaneously stimulating rural incomes. Industrial plantations were used to generate revenue with fast growing tree species such as genetically modified poplar, fruit trees, commercial trees and bamboo (Bae J. S., 2014)

2.2.5. The First 10-year Forest Rehabilitation Plan (1973-1978)

In 1973, the Korea Forest Service was relocated to the Ministry of Interior Affairs (later the Ministry of Home Affairs) and it supported the implementation of the First National Forest 10-year Rehabilitation Plan (Bae J. S., 2014). This Plan had three main strategies to guide policies, popularly known in Korea as rapid forestation,

3 Anthracite, often referred to as hard coal, is a hard, compact variety of coal that has a submetallic luster. It has the highest carbon content, the fewest impurities, and the highest energy density of all types of coal. It is considered the cleanest burning coal available. It produces more heat and less smoke than other coals (Sunshine, 2019).

national forestation, and economic forestation. The rapid forestation strategy focused on planting tree species that would grow quickly, such as alder, black locust, and poplar. The main objective of this strategy was to achieve fast reforestation and prevent further land degradation. The national reforestation strategy promoted local forest cooperatives and public participation in forestry activities. The economic forestation strategy focused on planting economically valuable trees such as Korean pine, chestnut, and walnut trees, to increase income for local communities (Kim & Son, 2019).

The Ministry of Interior Affairs (MIA) in consultation with the KFS, planned and coordinated efforts for greater inclusiveness among citizens, especially rural communities. For example, the MIA encouraged rural residents to build tree nurseries and produce seedlings, and then bought those products from them for reforestation efforts. Through these policies the MIA, promoted economic opportunities in rural areas while simultaneously fulfilling the high demand for seedlings (Bae , Rin , & Kim , 2012).

2.2.6. The Second 10-year Forest Rehabilitation Plan (1979-1987)

The Second 10-Year Forest Rehabilitation Plan aimed to complete reforestation tasks that remained from the First 10-year Plan. Since large-scale forestation and greening had been accomplished, the Second Plan focused on specific forestry goals including increasing income for rural residents from forest resources. Due to a focus on specialized activities such as developing forest resources and commercial forests, the primary responsibility of forest policy planning and execution shifted from Ministry of Home Affairs (MHA) to the KFS which continued to be under the supervision of the MHA.

During the Second Plan, there was also a shift in community involvement by promoting environmental awareness which complemented the patriotic approach to voluntary tree planting and forest management (Bae J. S., 2014). In terms of forest tending, the "government promoted civilian led projects and took a supporting role. The areas planted were fertilized after three years with new aerial fertilization technologies and equipment. Overall, the tree- tending projects accomplished over 90% of the targets (Yoo , Kim, Jeon, & Lee, 2014). Furthermore, forestry goals were adapted based on changing external conditions. For example, the initial reforestation goal of 1.5 million ha was reduced to about 1 million ha due to rural labor shortages, increasing labor costs, and decreasing plantation target area. The Second Plan was completed one year early in 1987 with the reforestation of 1,075,000 ha, about 94% of the initial goal (Bae J. S., 2014).

The government also facilitated a shift from quantity to quality based on the commercial value of trees that were planted to cultivate forest resources. During this time, 80 large scale commercial forest complexes were created and reforestation projects focused on growing commercial tree species (Bae J. S., 2014). Starting in 1981, researchers began to survey soil samples and analyze environmental and soil data to choose site-specific species to plant. By 1987, the establishment of fuelwood forests was showing results as the number of households consuming fuelwood "fell by more than 700,000 compared to 10 years ago, and the consumption per household was also reduced from 4.1 M/T to 2.5 M/T. Thus, the total demand for forest fuels decreased to less than half" (Yoo , Kim, Jeon, & Lee, 2014).

2.2.7. The Third National Forest Plan (1988-1997)

During the Third National Forest Plan, the government focused more on enhancing the quality of forest resources and aimed at maximizing the public benefits of forests. Under this plan, forests were categorized into three groups, production (3,554,000 ha), public interest (1,503,000 ha), and semi-reserve (1,395,000 ha). Policies varied based on category and management objectives (Kim & Son, 2019).

Moreover, the government realized that they must seek

alternative ways to use forest resources and sustain the rural economy that is faced with the dual challenge of rapid urbanization and industrialization. The Korea Forest Service initiated policies encouraging agroforestry under the management of the Ministry of Agriculture and Forestry (Kim & Son, 2019). Agroforestry can be defined as a collective name for "land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence" (FAO , 2015). Agroforestry supported more stable incomes for forest workers through jobs that could earn profits quickly in the short-term in addition to income earned from timber production. Moreover, the government provided subsidies for rural residents, as their income depended on forest products and industries, which were vulnerable to urbanization and related pressures (Kim & Son, 2019).

During this phase, there was also a focus on recreation forests for public well-being. *In Korea, recreation forests refer to green spaces in or near urban areas that allow citizens to participate in outdoor activities.* Recreation forests provide various benefits such as physical and mental health benefits along with forestry education (Kim & Son, 2019). In 1998, there were 68 recreation forests with approximately 2.5 million users, and this number rose to 115 recreation forests in 2008 with approximately 7.6 million users (Kim & Son, 2019). As the number of recreation forests grew, their value also increased.

Furthermore, the international environment was also changing during this period as global awareness about issues related to climate change, environmental degradation and natural resource depletion increased. This increasing awareness resulted in several international measures such as the Convention on Biological Diversity, United Nations Framework Convention on Climate Change, and the United Nations Convention on to Combat Desertification. As Korea signed and ratified these international agreements[4], the Korean government reevaluated its position on ecosystem services from the reforested lands and how forest resources were used (Kim & Son, 2019).

Korea has since then reinforced its commitment to these international conventions. For example, in 2011, Korea hosted the tenth meeting of the Conference of the Parties to the UN Convention to Combat Desertification (UNCCD COP 10). The UNCCD remains at the centerpiece in the international community's efforts to combat desertification and land degradation in the drylands (International Institute for Sustainable Development (IISD), 2011). In keeping with its heightened interest international collaboration, Korea has organized UN Rio Conventions and the 12th Conference of the Parties of the United Nations Convention on Biological Diversity and won the bid to host the upcoming World Forestry Congress 2021.[5]

2.2.8. The Fourth National Forest Plan (1998-2007)

The Fourth National Forest Plan initiated a transitional phase for forest policies as the focus shifted from economic function to enhancing overall forest benefits including public and recreational benefits. The Korea Forest Service (KFS) concentrated on increasing the public benefits by developing valuable forest resources and fostering competition among private sector actors. The government allowed for greater private forest management, based on the capability and discretion of forest owners. The KFS consolidated legal and

4 In 2014, Korea hosted the Convention on Biological Diversity and reinforced its commitment to the ideas of "sustainable development, the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources" (Convention on Biological Diversity , 2019).

5 Korea wins bid to host World Forestry Congress 2021. Korea Herald http://www.koreaherald.com/view.php?ud=20161207000520

institutional influence by enacting the Framework Act on Forest, the Act on Promotion and Management of Forest Resources, the Act on the National Forest Management, the Act on Forest Culture and Recreation and the Act on Promotion of Forestry and Mountain Villages (Korea Forest Service, 2010).

Sustainable forest management practices were reflected in these forest policies and activities. The government focused on increasing the value of forest resources, nurturing the forest industry, and creating healthy forest environment for the public. To measure the effectiveness of sustainable forest management (SFM) practices, the KFS publicly developed and announced seven criteria and 36 indicators on SFM. Moreover, the forest sustainability index (FSI)[6] was used to quantitatively score the effectiveness of sustainable forestry management practices (Kim & Son, 2019).

The following table explains the objectives of SFM and outlines the FSI indicators that qualitatively score the effectiveness SFM practice.

Table 1. SFM criteria and Forest Sustainability Index (FSI)

SFM criteria	• Conservation of biodiversity • Maintenance of productive capacity of forest ecosystems • Maintenance of forest ecosystem health and vitality • Conservation and maintenance of soil and water resources • Maintenance of forest contribution to global carbon cycles • Maintenance and enhancement of socio-economic benefits of forests to meet the needs of societies • Legal, institutional, and economic frameworks for SFM
FSI	**Forest health (6 indicators)** • Area of forest/ percent of mature forest area/ Percent of arboretum area/ Area of forest genetic resources reserves/ Forest tending area/ Area of healthy forest **Economic value (7 indicators)** • Percent of potential timber production area/ Growing stock of potential timber production area/ Percent of forest area under SFM plan/ Forest production amount per ha/ Ratio of annual cutting to annual growth increment/ Percent of budget in the forest sector/ forest contribution to GDP **Public Value (6 indicators)** • Percent of protection forest area/ Carbon storage in forest biomass/ Carbon budget in forest biomass/ Recreation forest area per thousand population/ Urban forest area per thousand population/ Percent of forestry employment in economically active population

Source: Korea Forest Service, 2014

6 Forest Sustainability Index'(FSI) is a "quantitative score used to indicate the overall quality and conditions of SFM. This takes into consideration environmental, social and economic conditions at the local and national levels" (Korea Forest Service, 2019).

Specifically, the Jeju Experimental Forests (JEFs) illustrate a pertinent example on sustainable forest management (SFM) practices along with the importance of research for effective policy development. The JEFs are the first forests in Korea to be certified as "Forest Stewardship Council-Forest Management" (FSC-FM) in 2006, which is a hallmark of SFM. These forests aim to protect natural forest ecosystems, promote forest productivity, enhance benefits of forests, and increase public participation in forest management (Kim, et al., 2017). The forests on Jeju Island are in an ideal location on for research initiatives, due to the number of well-preserved forests and the ecological significance of the island as a natural home of indigenous, endangered animal and plant species.

The Jeju Experimental Forests were managed by a series of plans starting from 1973 under the supervision of the KFS. The first Long Term Management Plan (2006-2015) had both environmental and economic components to it (Kim, et al., 2017). During the implementation of this plan, several concrete results were achieved: 64.3 ha of newly established forests along with 894.9 ha of preexisting forests saw enhanced value through replanting, fertilization, weeding, and thinning tasks. The SFM practices aimed to increase rates of timber production, ecotourism, local employment, and to improve ecosystem services e.g. climate change adaptation and soil erosion control, water storage, water and air purification (Kim, et al., 2017). Research and data collected from forests and nurseries in Jeju also supports "development and modification of forestry practices nationally, with special focus on ecosystem monitoring, seedling production, and ecosystem service estimation" (Kim & Son, 2019). Consequently, the Jeju Experimental Forests support the dual purpose of achieving SFM while providing social and economic benefits to local people (Kim & Son, 2019).

2.2.9. The Fifth National Forest Plan (2008-2017)

The Fifth National Forest Plan was a continuation of the Fourth Plan; it was designed to include policies on establishment of urban forests for expansion of green space in urban areas. It included the expansion of urban forests as a means of carbon sequestration as one of its 25 strategies (Park & Youn , 2013).In Korea, urban forests are officially defined (by Article 2 of the Establishment and Management of Forest Resource Act of 2005) as "any forest and trees that are created and managed in a city for the health, recreation, emotional cultivation, hands-on activities, etc. of citizens". Therefore, urban forests encompass all wooded areas in a city, including trees on the side of the street, parks, trails or any other areas with trees (Park & Youn , 2013).

According to the Act, KFS and city governments have joint responsibility for the establishment and implementation of plans for urban forestry. Under this arrangement, the KFS establishes a national forestry plan with overarching objectives. City governments then formulate and implement plans at the local level to fulfill the national objectives set by the KFS. In 2007, KFS promulgated the first basic plan of urban forestry for the period from 2008 to 2017 (Park & Youn , 2013).

The Fifth Plan also highlighted the importance of forest functions in responding to climate change and their social benefits for better quality of life. Under this plan, the KFS focused on promoting the significance of forest conservation for ecosystem health, disaster management, economic growth and recreational purposes (Korea Forest Service, 2010). In 2010, Korea launched the forest carbon offset scheme and subsequently enacted the Act on the Management and Improvement of Carbon Sink (Carbon Sink Act) in 2012. The Carbon Sink Act specifies activities for maintaining and improving forest carbon sink functions (Kim & Son, 2019).

2.2.10. The Sixth National Forest Plan (2018-2027)

The Sixth National Forest Plan established a long-term (2018-2037) vision and strategy for sustainable forest management. The plan focused on three main aspects, economic forests that create jobs; welfare forests that benefit citizens and forest for conservation of biodiversity and disaster mitigation (Korea Forest Service, 2019).

Based on these three objectives, eight specific strategies were developed: the enhancement of forest resources and mountain management system; forest industry development and job creation; stabilizing income of forest workers and revitalizing mountain villages; establishment of forest welfare system in everyday life; maintaining and promoting forest ecosystem health; realization of national safety through forest disaster prevention and response (Korea Forest Service, 2019). The following table summarizes the national forest plans and their specific objectives.

Table 2. Summary of the National Forest 10 year Plans established in Korea

Period	Major policies and practices
First (1973-1978)	• Engagement of the national reforestation program • Establishment of fuelwood forests • Promotion of participatory activities in tree planting and seedling production • Readjustment of slash-and-burn cultivation fields • Substitution of fuelwoods to fossil fuels
Second (1979-1987)	• Forest soil survey to select the area to establish commercial forests • Creation of commercial forest complexes • Encouragement of forest tending works for the reforested lands • Official completion of the national reforestation program
Third (1988-1997)	• Subdivision of the reforested lands per the management objectives • Implementation of alternative crop trees and forestry-related machineries • Enhancement of infrastructure for forest management, including forest roads • Establishment of the first recreation forest in the country • Initial consideration of sustainable forest management
Fourth (1998-2007)	• Thorough revision of the forest law to account for socio-economic changes • Legalization of forest utilization for recreational purposes • Promotion of agroforestry in rural areas • Diversification of short-term income forest products
Fifth (2008-2017)	• Extensive evaluation of public benefits of the national forest ecosystems • Pilot application of direct payment systems for the forest environment
Sixth (2018-2027)	• Forest industry development & job creation • Income stabilization and activation of forest village • Leading international forest cooperation and completing forest reclamation on the Korean Peninsula • Realization of national safety through forest disaster prevention and response

Source: Sustainable Development Goals Policy Brief No.10, p.11,2019

In terms of main actors, the Ministry of Commerce and Industry (MCI), the Ministry of Agriculture and Forestry (MAF) and the Ministry of Home Affairs (MHA)[7] coordinated complimentary policies towards objectives such as energy substitution and control of timber demand and supply. Arguably, the Korea Forest Service was the most important actor for policy implementation.

2.3. The Korea Forest Service

During the implementation of Second 5-year Economic Development Plan, the government established the Korea Forest Service (KFS) in 1967[8]. It was established as an independent organization under the supervision of Ministry of Agriculture and Forestry. The agency was tasked with the formulation and implementation of policies related to reforestation, forest protection and the development of forest resources and forest industries. (Bae J. S., 2014). In 1973, the KFS was reorganized and placed under the supervision of the Ministry of Home Affairs.

With the completion of the Second National 10-year Forest Rehabilitation Plan in 1983, the KFS was placed under the supervision of the Ministry of Agriculture and Forestry once again (Korea Forest Service, 2010). KFS has continued to remain an independent agency under this ministry which has been reorganized and renamed several times and is currently called the Ministry of Agriculture, Food and Rural Affairs (Ministry of Agriculture, Food and Rural Affairs, 2019). The changing role of the KFS and the impact of these transfers will be discussed later in the paper.

2.4. Implementing Reforestation Polices through Ministry-level Coordination and Cooperation

From early on, the administration realized that to successfully achieve reforestation across the country a holistic approach was required. A multitude of objectives were agreed upon and prioritized, including energy substitution, control over timber demand and supply along with community involvement for planting and forest management. Policy implementation simultaneously took a vertical and horizontal integration approach. This section of the paper presents details about the responsibilities each ministry took on to achieve these objectives.

2.5. Energy Substitution

After the Korean War, policymakers recognized that there was an urgent need to protect existing forests and strengthen on-going reforestation efforts. For this, energy substitution was considered essential for forest rehabilitation. During this time, due to limited resources and financial constraints, coal was identified as the only affordable and viable substitute for the country, at that point. The government expanded coal mining by signing an agreement with the United Nations Korean

7 The Ministry of Commerce and Industry was responsible for commerce, trade, mining, fuel, electricity, industry, and patents. It was launched on July 17, 1948 and was later reorganized as Ministry of Trade, Industry and Energy (Ministry of Trade, Industry and Energy, 2016). The Ministry of Agriculture and Forestry was responsible for agriculture, rural development, farmland and livestock. It was established on July 17, 1948 and reorganized as Ministry of Agriculture, Food and Rural Affairs (Department of Agriculture, Food and Rural Affairs, Government, 2019). The Ministry of Home Affairs was the responsible for local administration, local finance, local economy, local taxes, elections, supervision of municipalities, civil defense, disaster management, and firefighting. It was established on July 17, 1948, and was later reorganized as Ministry of the Interior and Safety in 2017 (Ministry of the Interior and Safety, 2019).

8 Before becoming the KFS, this agency was called the Forest Bureau (under Ministry of Agriculture and Forestry), it's transition to KFS was considered a promotion due to greater independence and greater resources (Lee, 2013).

Reconstruction Agency (UNKRA)[9] for investment in the coal sector, and provision of technical support (Park & Youn, 2017).

Under this agreement, innovative mining techniques and modern safety measures were introduced through imported mining machinery and equipment. The UNKRA programme for the rehabilitation of Korean coal and metal mines received a budget of approximately USD 13 million (United Nations Photos, 2009). Consequently, government-owned Dai Han group of coal mines "surpassed the target figures set in the five-year production plan, having risen from an annual output of 667,631 tons in 1954 to over 1,520,000 tons in 1957" (United Nations Photos, 2009). The UNKRA also "engaged the services of British mining consultants and technicians to work with Korean mine managers, engineers and technicians in the rehabilitation and modernization of the coal mines" (United Nations Photos , 2009).

In partnership with UNKRA, Korean government ministries coordinated their efforts to encourage rapid energy substitution based on their comparative advantage. Specifically, the Ministry of Commerce and Industry (MCI) focused on increasing the country's coal output. The MCI developed various projects and policies to promote a transition from fuelwood to coal briquettes including a rapid increase of supply (Bae , Rin , & Kim , 2012). The MCI worked with the Ministry of Agriculture and Forestry (MAF), to prohibit the shipment of firewood to major cities to encourage energy substitution. By 1970, only 7% of urban areas continued to use fuelwood for household energy requirements[10] (Park & Youn, 2017).

The Ministry of Agriculture and Forestry successfully planted 435,555 ha of fuelwood forests to supply to rural areas that continued to require fuelwood in the short-run (Park & Youn, 2017). At the same time, the Ministry of Home Affairs (MHA) supported the long-term goal of energy substitution by remolding cooking areas in rural households. This remolding aimed to promote energy efficiency and to support a transition from fuelwood to coal briquettes. Due to these efforts, fuelwood usage for domestic purposes decreased by 32% over 10 years (Park & Youn, 2017).

The success of energy substitution as a policy was largely due to complimentary activities between the Ministry of Commerce and Industry, Ministry of Agriculture and Forestry, and Ministry of Home Affairs. Through well-coordinated efforts, these ministries increased the availability of alternative energy sources, banned fuelwood and provided support to citizens as they transitioned to an alternative energy source.

2.6. Controlling Timber Demand and Supply

During the First National Forest Plan from 1973 to 1978, the establishment of government control over the supply and demand of timber was integral to the success of reforestation efforts in Korea. To decrease the demand on

9 The United Nations Korean Reconstruction Agency (UNKRA) was established to administer the relief and rehabilitation programme of the United Nations in Korea. This programme was financed by voluntary contributions from Member and non-member Governments. Specialized agencies and non-governmental organizations were asked to contribute facilities, advice and services. The General Assembly "established the United Nations Korean Reconstruction Agency (UNKRA) under the direction of a United Nations Agent General, who shall be assisted by one or more deputies. The Agent General shall be responsible to the General Assembly for the conduct (in accordance with the polities established by the General Assembly and having regard to such general policy recommendation as the United Nations Commission for the Unification and Rehabilitation of Korea may make) of the programme of relief and rehabilitation in Korea, as that programme may be determined from time to time by the General Assembly." (A/RES/410). The Agency also worked with the United Nations Commission for the Unification and Rehabilitation of Korea (UNCURK AG-049) and the Advisory Committee. It ceased operating in 1959, and liquidation was completed in 1960 (United Nations Archives, 2017).

10 Rapid urbanization amplified the effectiveness of these policies as it became easier for the government to restrict the usage of fuelwood by prohibiting shipment into urban areas. Rapid urbanization also led to a decrease in illegal logging and a decrease in slash and burn agriculture as the number of people dependent on these activities for a livelihood decreased.

timber, the Ministry of Agriculture and Forestry (MAF) banned its usage for production purposes, including hangers, chopsticks, umbrella stands and ice cream sticks between 1973-1978 (Andoh & Lee, 2018). The Korea Forest Service also issued a notification that prohibited the harvest of timber except for maintenance purposes like removing damaged trees and thinning (Park & Youn, 2017).

Furthermore, as various ministries were involved in construction projects, they actively focused on reducing the use of timber in raw construction materials. The Economic Planning Board limited the construction of houses, governmental offices and buildings of state-operated enterprises by limiting construction budgets. Additionally, the Ministry of Construction refused construction permits for buildings and for entertainment facilities deemed unnecessary. While the Ministry of Commerce and Industry focused on increasing the production and distribution of cement as an alternative construction material effectively lowering the consumption of timber for construction purposes (Park & Youn, 2017).

Simultaneously, the national government reduced tariffs on timber imports to further reduce pressure on domestic timber sources. The amount of imported timber increased almost fifteen times from 590 thousand m3 in 1962; to 8770 thousand m3 in 1977 (Park & Youn, 2017). Due to this careful control of timber, domestic timber consumption was reduced from 53% to 11% by 1977 (Andoh & Lee, 2018).

2.7. Inclusive Forestry

Environmental inclusiveness as a concept is based on the idea that the relationship between people and the natural environment has dramatically transformed (McNeill & Engelke, 2014). At the local level this concept can relate "to the need to secure tenure and access rights to natural resources and the protection of local ecosystems. At the national level, it suggests the need of adequate management of natural resources and to ensure the sustainability of ecosystem services. At the transboundary and global level, it involves the international principles of not causing harm to other countries and of common but differentiated responsibilities in dealing with global problems" (Gabay & Rekola, 2019). Inclusive forestry could, therefore, refer to creating a balance between environmental protection and economic demand with the involvement of and for the benefit of local communities and individual citizens. Programmatically, inclusive forestry can translate into community forestry initiatives, raising public awareness and mobilizing citizens for planting, protecting and managing forests.

In Korea's case, inclusive forestry included raising awareness about the importance of reforestation, nationwide tree planting, community patrolling to prevent illegal logging, along with community forestry and community-based nursery projects. These activities not only promoted reforestation but also stimulated rural economies to the benefit of those communities. Korea implemented extensive community-level forest rehabilitation projects through a movement called Saemaul Undong.

2.7.1. New Village Movement

Saemaul Undong (SU) which translates into the New Village Movement, began in 1970. It was a systematic movement that aimed to simultaneously alleviate poverty in rural areas of the country and reforest denuded lands. To implement the First Plan, the government mobilized and coordinated the administrative power of every central, province, county/city, and village unit (Bae J. S., 2014). The government worked through direct and indirect channels to facilitate community participation and increase rural income. Direct channels include subsidies and provisions of food for citizens who participated in reforestation activities; and government officials working with community members to patrol local forests to prevent illegal logging and poaching. Indirect channels included support for community forestry projects led by local governments. Furthermore, benefits for rural citizens included, fuelwood forests to provide low income villagers with a source of legal fuelwood. As well as, fast-growing

tree species such as black locust and poplar to supplement rural incomes (Park & Youn, 2017).

The Ministry of Home Affairs (MHA) designed and implemented Saemaul Undong through a variety of mechanisms and projects. Community forestry projects included "establishing firewood plantations and tree nurseries in agricultural and mountainous villages. The MHA provided financial and technical support for forestry projects and encouraged villagers to take up cooperative projects under SU. To facilitate public participation in reforestation, the government paid fees to the people who participated in building village nurseries and planting trees for erosion control" (Park & Youn, 2017). These projects were mutually beneficial to all the actors involved. One such example is the poplar scholarship fund. From 1963, the National Forestry Cooperative Federation started encouraging rural residents to plant 100 Italian poplar trees on every farm and along riverbanks. By 1970, a total of 20 million poplar trees were planted nationwide. This programme provided an opportunity for collective farming in the communities and the farmers agreed to use the profits from poplar logging to create a scholarship fund for students entering high school. These scholarships incentivized villages to continuously plant poplar trees which resulted in a total planting area of 730,000 ha across the country by 1985 (Lee, 2013).

The Home Affairs Ministry was integral to the implementation of this policy at the household level as well, and worked extensively with community leaders and local governments. Together they supported rural citizens by helping them remodel their kitchen stoves to use other energy sources (including coal briquettes) instead of firewood (Park & Youn, 2017). This reduction in household consumption of fuelwood was a significant factor for successful reforestation efforts as the ratio of households using firewood went from 37.9% in 1980 to 5.8% in 1990 (Park & Youn, 2017).

2.7.2. Sallimgye

In 1951, the Ministry of Agriculture and Forestry was given the authority to establish local forestry cooperatives, called Sallimgye. Participants at the community-level included forest owners and rural residents. The main objective of Sallimgye was the preservation of forest resources in accordance to government policies. This included activities such as patrolling the forests against illegal trespassing, logging and poaching. However, these activities had a limited impact during this period. Once the Forest Law (1961) was enacted and the economic and social benefits of forest resources were recognized; forest rehabilitation became a national priority which increased the scope and impact of Sallimgye dramatically (Kim & Son, 2019).

In 1973, the government renewed with Sallimgye with a community-based nursery system as a part of Saemaul Undong. Sallimgye members led the participation of local people in the nursery operation who served and grew seedlings of major plantation species, including black locust, chestnut, poplar, and pine. The government also aided the operation of the nurseries by providing loans, technical support and buying all the produced seedlings. Such community-based nurseries earned a total of 12.3 billion KRW (equivalent to 23.0 million USD) between 1973 and 1979, which significantly contributed to the local economy (Kim & Son, 2019). This system ensured income for villagers and provided domestic sources for the high demand of seedlings in the country.

Public participation contributed significantly to the success of reforestation in Korea. As an example, extensive participation among villagers in forestry projects helped decrease illegal logging drastically by providing them with alternative sources of income. From 1979 to 1987, illegal logging declined from 17,923 to 2,526 ha per year. The illegal logging of timber declined from 17,673 m^3 to 2211 m3 per year (Andoh & Lee, 2018). The government successfully continued to maintain citizen support and participation through a combination of public awareness campaigns and material benefits.

2.7.3. Nationwide Tree Planting and Public Awareness Campaigns

In 1946, the Korean government established Arbor Day on April 5th. The aim was to encourage forest transition through a national celebration promoting trees, forests, tree-planting and gardening. Lee Kyung-Joon notes that from early on, Arbor Day events were politically significant, and hundreds of people attended the ceremony to listen to speeches. At the beginning, politicians stressed that people should contribute but did not have a concrete plan that outlined specific activities where public participation was possible (Lee, 2013).

During the 1973 Arbor Day celebrations, President Park Chung Hee gave a highly influential speech clearly establishing a linkage between national pride and reforestation. Successive events helped the leadership solidify a linkage between patriotism and successful reforestation. The President's involvement in reforestation activities was publicized well. The government was effective in creating an emotional attachment between citizens and reforestation efforts by repeatedly declaring that cutting trees was immoral and planting trees was moral. At the same time, the government provided opportunities for active citizen participation through national and community events. These efforts resulted in developing a sense of pride among people, fueling greater participation and greater community vigilance against illegal practices that negatively impacted forests (Bae J. S., 2014).

By 1979, "nationwide tree planting was well established due to the persistent promotion of reforestation by the government. During the National Tree-planting Month (March 21st to April 20th), people willingly participated and learned about the importance of tree planting and tending. Specific tasks were assigned to different government agencies and villages to facilitate the planting activities. Additionally, the first Saturday of every November was declared as the National Tree-tending Day. On this day, the entire nation participated in tending activists through villages, schools, workplaces, or forest related organizations. The purpose of this was to raise awareness of the importance of tending as well as planting" (Bae J. S., 2014).

The high level of active public participation contributed significantly to the success of reforestation in Korea. Citizens were mobilized in villages and dedicated government officials ran training programs for months at a time. In 1971, approximately 3,453 villages participated in community forestry programs and this number increased to approximately 15,598 villages by 1975. In terms of participants, there were 1.24 million participants in 1972 which increased to 6.4 million by 1977. As a result, a total of 2.9 billion trees were planted over an area of 1.08 million ha from 1973 to 1978 (Andoh & Lee, 2018).

Vertical integration, effective coordination and a clear delineation of responsibilities were demonstrated by how certain reforestation projects were implemented. While the process was agreed at the national level, enforcement was under the purview of local Forest Cooperative organizations around the country. Once the Village Forestry Cooperative agreed on specific projects, the county Forest Cooperative determined needed areas, plant species, and sites. The central government "provided seedlings and fertilizers for free, while local government paid the cost of freight". Additionally, the central Forest Cooperative provided technology, and the Village Forest Cooperative planted trees by mobilizing free labor and taking charge of post-management" (Lee, 2013).

The nation-wide tree planting movement became an important example of cooperation among ministries. The Ministry of Culture and Education was responsible for the student tree-planting movement, the Ministry of Agriculture and Forestry for the provision of fertilizer, the Ministry of National Defense for reforestation on the military bases, and the Ministry of Culture and Public Information for campaigns supporting the effort. The KFS was also played a significant role in this project, providing needed materials for tree-planting, planting sites, and technical training (Bae J. S., 2014). There was a clear delineation of responsibilities allowing the ministries to avoid overlap and to pursue complimentary activities to achieve reforestation. The combination of

public awareness, citizen mobilization and government support worked together so seamlessly that the ten-year reforestation program was completed in six years (Andoh & Lee, 2018).

2.8. Institutional Restructuring for Improved Forest Policy Implementation

Institutional restructuring and reorganization were significant contributors to successful policy implementation in the Korean forestry sector. Departments were transferred between ministries and new departments were established based on the changing needs and objectives of the national reforestation project. This flexibility contributed to sound intragovernmental coordination and effective policy implementation.

In 1973, the Korea Forest Service (KFS) was transferred from the Ministry of Agriculture and Forestry (MAF) to the Ministry of Home Affairs (MHA). This transfer significantly strengthened the administrative power of KFS and its mandate to protect forests. Under the MHA, the KFS was directly connected with local governments including provinces, cities and townships. Policy implementation became more effective with the support of local governments and law enforcement. Financially, local government investment was matched by the KFS (Park & Youn, 2017).

Moreover, by 1973, all the provinces, (except the province of Jeju) and all the counties established a Division of Forestry in their administrative offices. This restructuring ensured greater accountability and responsibility among local governments to protect and manage forests in their jurisdiction. For forest management increased involvement of local administrations led to greater participation of the individual citizens and communities(Park & Youn, 2017).

After the KFS was transferred to the MHA, the police controlled illegal logging much more effectively due to support from KFS. During this period, incidents of illegal logging decreased substantially. The “number of illegal logging incidents identified by officials decreased from 17,923 per year from1967–1972 to 2,526 per year from 1979–1987. The volume of timber illegally logged also decreased from 17,673 to 2,211 m^3 per year in the same period” (Park & Youn, 2017). Thus, this transfer to the MHA greatly improved the effectiveness of KFS to fulfill their mandate to protect forests and greatly supported forest transition in Korea.

Simultaneously, the Ministry of Home Affairs established the Regional Development Bureau, Urban Development Bureau and Rural Development Bureau for Saemaul Undong.The Ministry of Agriculture and Forestry, the Ministry of Commerce and Industry and the Ministry of Education also established divisions of Saemaul Undong. These reorganizations enabled multi-level stakeholders to participate in reforestation projects (Park & Youn, 2017).

As the objectives of the Second Plan were successfully achieved, the Korea Forest Service was transferred from the Ministry of Home Affairs to the Ministry of Agriculture, Forestry and Fishery. With this transfer, the focus of their mandate evolved to forest resource development and connecting forestry policy with rural and fishing community development projects (Yoo , Kim, Jeon, & Lee, 2014).

2.9. Government Investment in Reforestation

In Korea, political commitment to reforestation was clearly demonstrated by high levels of financial investment in forestry sector, and these levels grew relative to economic growth. Financial allocations included government revenue, aid from the United Nations Development Programme (UNDP) and World Food Programme (WFP). The figure below shows that yearly budget of KFS from 1967 to 1987.

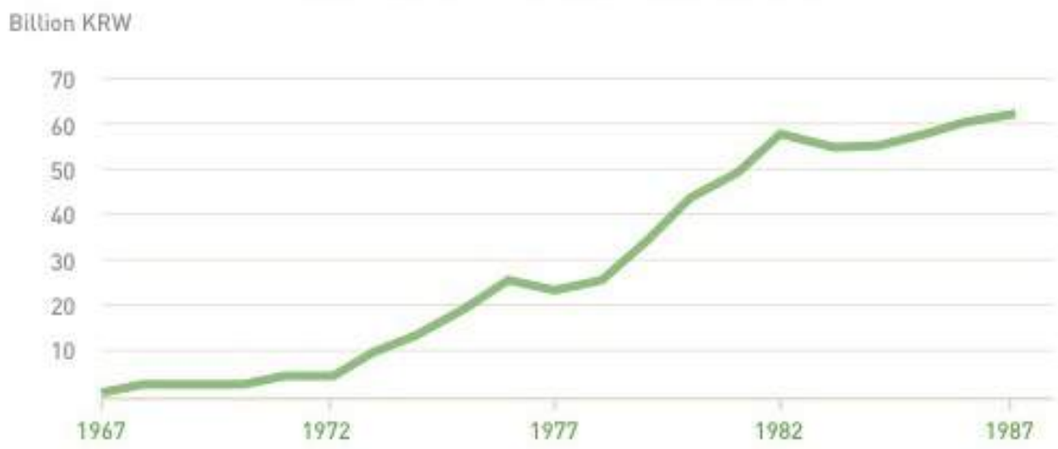

Figure 1. Yearly Budget for the KFS(1967~1987)

Source: Bae, Jae Soo et al. 2014, Lessons learned from the Republic of Korea's National Reforestation p.20

The KFS's budget grew from KRW 2.1 billion in 1967 to KRW 6.3 million in 1972. The resources available for the national forest management sector increased from KRW 330 million in 1966 to KRW 2,556 million in 1972 (Bae J. S., 2014). Furthermore, when the First Plan was set into motion in 1973, the government set aside more than KRW 10 billion (more than 1% of the national budget) for the KFS. Funding for this programme more than doubled within the next five years. During the Second Plan, the annual budget grew continuously, although it dropped (to 0.3 ~ 0.5% of the national budget) when considered as a percentage of the national GDP. Against this backdrop, it becomes clear that strong financial support from the government helped implement the National Reforestation Programme by enabling projects focused on tree planting and tending, erosion control, and nursery development (Bae J. S., 2014).

2.10. Institutional Mechanisms for Coordination among Stakeholders

The Park Chung Hee administration was in power from 1963-1979. During this period, political, economic and environmental structures were completely transformed. The country industrialized rapidly and achieved what is referred to as Korea's "economic miracle". Along with economic development, President Park had a strong personal dedication to forest transition in Korea (Lee, 2013). This dedication is demonstrated by how the Korea Forest Service and the Forest Bureau before it, reported directly to the President (Lee, 2013).

In Korea's case, the strong political commitment included a deep attachment to the success of reforestation, among the president and key ministers. Additionally, strong leadership was integral to well-coordinated forestry policy. The government had a robust vision with concrete objectives and delineated clear jurisdictions and responsibilities among the ministries. This top-down approach, where negotiations and decisions were reached among the president and cabinet members allowed Korea to avoid challenges related ministry-level miscommunication and competition. The ministries also avoided activities that were overlapping or contradictory and agreed on tasks that were complimentary and sought to achieve a single objective. An example of this approach is the emergency cabinet meeting on March

24th 1973, which included members from the cabinet and assembly. The meeting discussed the transfer of the KFS to the Ministry of Home Affairs and their plans for forest rehabilitation and preventing illegal logging (Lee, 2013). During this meeting, ministers also negotiated access to forests. They agreed that individuals would be banned from entering public forests for one year and could only enter as a group under the supervision of village authorities. In contrast, private forests were open and controlled by the owners (Lee, 2013). This example of a specific meeting may be useful as demonstration of the thoroughness of policy discussions at the top-level along with the collaborative decision-making process.

The First Plan was planned and implemented under the direct supervision of Forest Minister Son Su Ik (1973-1978). During his tenure, the KFS established accurate, efficient rehabilitation plans, achieving the targets set under the First Ten-Year Plan in only six years (Bae J. S., 2014). Utilizing his strong leadership, forest Minister Son established an "interlinked-cooperative framework for forest-related policies" According to Bae, Minister Son ran a strict administration with supervision, field guidance and assessments. At the same time, he was supportive of forestry officers and provided them with new opportunities which seems to have boosted their morale" (Bae J. S., 2014).

Korea also utilized inter-ministerial participation in meetings as a coordination mechanism. For example, the Head of the Korea Forest Service participated in both "Emergency Cabinet Meetings and Saemaul Cabinet Meetings, resulting in smooth cooperation with related ministries for budgets" (Lee, 2013).

The leadership practiced close monitoring and evaluation of the departments involved and implementation activities (Lee, 2013). As Lee notes, , the Minister of Home Affairs, Kim Hyun-Ok went to the Korea Forest Service every morning during the national tree-planting period (March 21 to April 20 1973) to monitor the reforestation efforts (Lee, 2013). The Ministry of Home Affairs also established "planted tree inspections". These inspections had supervision teams check the conditions of planted trees at various sites, year around after initial reports by local governments about numbers of saplings planted in the spring. This supervisory system was setup to create greater accountability and prevent misleading or false claims. These inspections were executed by both provincial authorities and KFS authorities. Over two dozen forestry official were selected from each province and they inspected conditions in a different province. For example, officials from Gangwon Province engaged in inspecting the conditions of planted trees in Jeonbuk Province. This setup was in place reportedly to ensure that inspections were objective and not impacted by regional loyalties or pressures. Inspections were thorough, well-managed and effective. Lee also notes that in 1974 "planted tree inspections" were "performed *tree by tree* for a total of 310 million trees at 27,000 sites around the country. With the aid of this year-round inspection system, the average survival rates of the planted trees reached over 90 percent during the six years of the reforestation project" (Lee, 2013).

In Korea's case, strong political commitment by the leadership and concentrated power at the top allowed for effective and efficient implementation of forestry policy. However, there are a variety of other institutional mechanisms that can be utilized for policy integration and greater coordination within government. These mechanisms include: high-level ministerial meetings to negotiate objectives and responsibilities along with independent planning commissions and multi-stake holder meetings.

3. Comparative Case Study: The Republic of Ghana

Ghana approached reforestation with a strategy similar to Korea, which included coordinated national forestation plans and collaboration among government departments. However, there are certain key differences in how policy integration was approached in Ghana compared to Korea. Ghana primarily implemented a vertical approach whereas Korea implemented an approach with both horizontal and vertical dimensions.

In general, horizontal integration refers to coordination and collaboration among the national government, national ministries and departments at the same level. Vertical integration refers to the national government's collaboration with actors on different levels of the organizational ladder, including local governments, community leaders, and civil society groups. However, it should be noted that these are academic definitions and perfectly clear lines cannot be drawn on a practical country-level as most countries employ both dimensions to some degree.

3.1. Background

Over the last century, Ghana has experienced rapid deforestation due to a variety of factors, including rapid population growth, unsustainable agricultural practices, excessive logging, certain mining practices, forest fires and growing infrastructure (Gyamfi Asiedu, 2019). In recent years Ghana's deforestation rate has been about 135, 395 ha annually, resulting in a dramatic decrease in the forest cover from approximately 7.5 million ha in 1990 to 4.9 million ha in 2010 (Oduro, Mohren, Pena-Claros, Kyereh, & Arts, 2015). A 2016 report issued by Ghana's Forest Commission, stated that approximately 80% of Ghana's forest resources under state management had been lost to illegal logging activity since 1990 (Ministry of Lands & Natural Resources, 2016). The current state of Ghana's timber industry also demonstrates the extent of excessive logging. Ghana was one of the leading timber exporters in the world for decades; but its forest cover shrunk so significantly over the years that timber processors are considering importing timber (Oduro, Mohren, Pena-Claros, Kyereh, & Arts, 2015).

Global Forest Watch recently used updated remote sensing and satellite data from the University of Maryland and estimated that there was a 60% increase in Ghana's primary rainforest loss in 2018 compared to 2017, the highest in the world (Gyamfi Asiedu, 2019). Primary rainforest refers to crucial forest ecosystems, containing trees that can be hundreds or even thousands of years old. Primary forests store more carbon than secondary forests and are irreplaceable for sustaining biodiversity (Mikaela & Dow Goldman, 2019). This level of forest degradation has both national, regional and international consequences for climate change.

Furthermore, deforestation resulted in dwindling resources, land degradation, species depletion and loss of biodiversity in Ghana. The consequences of climate change are tangible as the country experiences an "increase in extreme weather conditions, with more frequent incidences and longer periods of drought, flooding, and lowering of water levels, particularly in the Volta River, which provides about 80% of the national electricity supply" (Oduro, Mohren, Pena-Claros, Kyereh, & Arts, 2015). Environmental damage and deforestation are further accelerated by forest policy failures, impracticable forest fee regimes, external prices of timber and weak institutional structures (Ministry of Lands & Natural Resources, 2016).

Like Korea, Ghana experienced increased economic growth and urbanization, with GDP per capita increasing from USD 398 in 1990 to USD 1,766 in 2015 (World Bank, 2019). The percentage of urban population increased from 36% in 1990 to over 54% in 2015 (World Bank , 2019). However, compared to Korea, the increase in growth rates in Ghana has not been as rapid. Also, unlike Korea, employment remains concentrated in rural areas,

specifically in the agriculture sector which employs 56% of the population compared to 15% in industry and 29% in the service sector. Consequently, agricultural land is plentiful and continues to expand, and rural labor remains abundant (Oduro, Mohren, Pena-Claros, Kyereh, & Arts, 2015).

3.2. National Plans for Reforestation

The Government of Ghana responded to the crisis of rapid deforestation through policies that restrict forest exploitation, ban the exportation of certain timber species, promote sustainable management practices and promote fuel wood substitution (Oduro, Mohren, Pena-Claros, Kyereh, & Arts, 2015).

In 2001, the National Forest Plantation Development Program (NFPDP) was initiated by the government through the Forestry Commission. The implementation of these plans included robust partnerships with the private sector and local communities (The Forestry Commission of Ghana, 2019). The national program included the following goals: restore degraded forest lands; address shortage of forest resources, especially timber, and fuelwood needed for household consumption; create employment opportunities for rural communities; increase food production in the country (The Forestry Commission of Ghana, 2019).

The NFPDP was implemented primarily under three programs, the Modified Taungya System (MTS), Large Scale Private Commercial Plantations Development (LSPCPD), and the Government Expanded Plantation Program (GEPP). These programs had the overarching goal of planting 20,000 ha of trees annually (Andoh & Lee, 2018). As a result of these initiatives, about 149, 260 ha of plantations were established under the NFPDP between 2002 and 2010. However, these plantations were not adequately maintained and about 15% were destroyed by forest fires (Oduro, Mohren, Pena-Claros, Kyereh, & Arts, 2015).

Under the Modified Taungya System (MTS), the Forestry Commission (FC) enabled farmers to combine tree planting and maintenance with the cultivation of food crops in degraded forest reserves. The FC surveyed and demarcated degraded forest reserve lands and provided farmers with technical assistance along with supplies and seedlings (Forestry Commission, 2017). The farmers retained 100% share of the food crops and a 40% of profits from timber returns. The government had a 40% share while landowners had 15% and communities had a 5% share. About 54% of the total area of plantations established under the NFPDP between 2002–2010 was through MTS (Forestry Commission, 2017). Due to the effectiveness of the plan, the government planned to reintroduce these programs during Ghana's current Forest Plantation Strategy (2016-2040).

The Large Scale Private Commercial Plantations Development (LSPCPD) program, allowed the government to release degraded land to private organizations with the proven intention to establish large-scale plantations that will support the objective of reforestation. Through this program, the private investor earns 90% of the total proceeds from the plantation while the rest is divided among the landowner (6%), government (2%) and community (2%). More than 23,360 ha of forest plantations were established through this scheme (Oduro, Mohren, Pena-Claros, Kyereh, & Arts, 2015).

In 2010, the Government Expanded Plantation Program (GEPP) commenced. This plan concentrated on degraded lands outside forest reserves with a focus on commercial timber plantations. A total of 14,186 ha of plantations were established by the end of 2010. Furthermore, the GEPP has an annual target of planting 10,000 ha along with maintaining and protecting existing plantations over a 5-year period (Oduro, Mohren, Pena-Claros, Kyereh, & Arts, 2015).

The government also established an agency called Savanna Accelerated Development Authority (SADA) to coordinate a long-term comprehensive development strategy (2010–2030) for the northern savanna ecological zone. The SADA initiative aims to minimize the increasing development gap between the northern savanna

and the rest of the country while also addressing the impact of climate change in the region. Through SADA, the government launched a 5-year afforestation project aimed at encouraging tree planting to green the SADA zone. The project sought to plant and maintain an "initial five million seedlings of assorted trees in 2012-2013. Using the vision of a "Forested & Green North by 2030", the strategy stimulates economic growth and sustainable development. This is done by ensuring that small-holder families and poor farmers develop a long- term stake in agriculture by inter-cropping with economic tree species" (Oduro, Mohren, Pena-Claros, Kyereh, & Arts, 2015).

3.3. Energy Substitution

The Government of Ghana, like Korea recognized that energy substitution is key to successful reforestation. Both countries realized that without an alternative energy source that was readily available and inexpensive, forests could not be protected. In 1990, Ghana implemented its National Liquefied Petroleum Gas (NLPG) program. This program encouraged the Tema Oil Refinery (TOR) to modernize so that it could effectively implement an intensive liquefied petroleum gas campaign. The NLPG program sought to encourage the use of liquefied petroleum gas (LPG) instead of charcoal or fuelwood throughout the country. As a part of the initiative, the government setup a "established a gas cylinder manufacturing company to manufacture gas cylinders locally and make them available to the public at affordable prices. This intervention increased the quantity of cylinders in circulation from 80,000 in 1989 to 600,000 in 1997" (Broni-Bediako & Amorin, 2018). Furthermore, the program aimed to reduce the rate of deforestation and provide environmental and health benefits by subsidizing the cost of LPG relative to petroleum and diesel. Through this program, household use of LPG fuels in Ghana increased from 4% in 1998 to approximately 10% in 2006 (Andoh & Lee, 2018).

Despite such government intervention, household energy demand continues to rely on fuelwood. According to the 2010 population and housing census, fuelwood accounts for approximately 74% of household energy needs. This figure confirms that fuelwood remains the country's largest source of energy and employs thousands of people in the country (Broni-Bediako & Amorin, 2018).

Even with increasing consumption, there is significant discrepancy in LPG use in urban and rural areas of Ghana. In 2013, the Ministry of Energy and Petroleum launched a Rural LPG program to encourage the use of LPG in rural areas. Under the Rural LPG Program, the government distributed 50,000 free cylinders, cook stoves and related accessories to citizens in low-income areas with limited access to alternative energy sources. The government aimed to enable rural citizens to transition smoothly from fuelwood to LPG with minimal initial costs. So far, this program has underperformed. Challenges faced by the program include lack of effective safety education on using LPG, increase in LPG driven vehicles, frequent rise in the cost of LPG and its accessories, sporadic shortages of LPG, lack of accessibility and high level of risk in transporting LPG (Broni-Bediako & Amorin, 2018). These are some of the challenges that the government is currently facing for energy substitution.

3.4. Controlling Timber Demand and Supply

Ghana also recognized the importance of controlling the demand and supply of overexploited species such as timber to promote sustainable forest management practices. In 1995, the government introduced Interim Control Measures to control the exploitation of forest resources and transport of trees in areas outside forest reserves. One year later, an export levy (10–15%) was imposed on the free on board (fob)[11] price of air-dried

11 Free on board (FOB) designation specifies whether the buyer is responsible for freight charges and determines the obligations of parties when trading goods. The costs associated with FOB include transportation of the goods to the port of shipment, loading the goods onto the shipping vessel, marine freight transport, insurance, and unloading and transporting the goods from the arrival port to the final destination (Investopedia).

lumber of specific species. Followed by an additional levy of 1–10% fob value on all exports of primary and secondary wood products (i.e. lumber, curls, veneers and panel boards) was imposed in 2001. These measures were intended to slow down the depletion of high demand tree species and reduce the exploitation rate of the other species.

The government also introduced the reduced yield formula in calculating the annual allowable harvest to reduce timber exploitation. From 1997-1998, the Timber Resources Management Act and the Timber Resources Management Regulations were enacted to prohibit the use of chainsaws in the lumber industry, another attempt to control the rate of timber exploitation. Moreover, as of 2014, there has been a ban on the felling, harvesting and the exportation of rosewood in the Ghana (Oduro, Mohren, Pena-Claros, Kyereh, & Arts, 2015).

Timber and timber products remain one of Ghana's biggest exports and are a significant contributor to the economy. Therefore, the government is compelled to find ways to promote sustainable timber production instead of an outright ban on production. Despite these frameworks and regulations, illegal logging and an informal timber sector remain a serious challenge for authorities as they lack the capacity to enforce policies and regulations (Eshun, Potting, & Leemans, 2010).

3.5. Inclusive Forestry

Like many other developing countries, there is a growing trend towards urbanization in Ghana. In 1990, approximately 60% of Ghana's population lived in rural area. As of 2015, that number went down to 46% (The World Bank, 2019). Despite this trend, there remains a significant rural population in Ghana; and these communities are dependent on forests for livelihoods and energy needs. They are also directly and most severely impacted by deforestation and land degradation. For these communities, their quality of life is dependent on the health of Ghana's forests. Therefore, it seems natural to encourage community participation while raising awareness and support for the implementation of forest rehabilitation policies.

During the implementation of the NFPDPs, farmers supplied the needed labour for planting, clearing and maintenance of forests. Plantation workers were also hired to establish and maintain plantations with trained supervisors providing technical support. The central government provided land for plantations and technical support to community leaders and private investors. The government also consistently organized coordination and monitoring meetings with local authorities to support and oversee reforestation projects (Andoh & Lee, 2018).

Furthermore, local communities were involved in tree planting on farms (agroforestry system) and were a part of the solution to address soil erosion concerns and poor soil fertility. More than 30,000 people were involved in tree planting on farms and by 2003, they had planted approximately 10,000 ha. By 2010, there were more than "37,500 ha of cocoa farms planted with trees in over 108 farming communities, reflecting farmers' efforts to increase the number of trees across the cocoa landscape to enhance economic gains, improve agronomic productivity and contribute to biodiversity conservation" (Oduro, Mohren, Pena-Claros, Kyereh, & Arts, 2015).

However, in general, public participation in reforestation was restricted to labour needs in Ghana. Public awareness about the benefits of reforestation (or the dangers of deforestation) remained limited. The government did not make a consistent effort to raise awareness among citizens and create linkages between national well-being and reforestation as it had happened in Korea. Political commitment was not publicly reinforced with the same vigor as well.

Recently, Ghana has recognized the positive impact public awareness and citizen participation can have on the success of reforestation projects. The 2012 Ghana Forest and Wildlife Policy promotes tree planting and forest management to increase awareness about the significant role trees, forests and wildlife play in daily life and the importance of conservation. The policy also supports tree

planting for environmental improvements including peri-urban green-belts, riparian buffer zones, shade trees in public parks, and erosion control (Oduro, Mohren, Pena-Claros, Kyereh, & Arts, 2015).

3.6. Institutional Structures and Main Actors

In Ghana, the Ministry of Lands and Forestry (MoLF) is responsible for policy formulation, monitoring and evaluation of forestry activities. The Forestry Commission (FC) is the executive branch of the Ministry of Lands and Forestry responsible for setting criteria and monitoring plantation development on forest reserve lands. This commission also provides technical expertise to plantation investors. The FC has four divisions: Forestry Services Division (FSD); Wildlife Division; Forestry Products Inspection Division; and Timber Export Inspection Division. The FSD is subdivided into five Departments: Resource Management Support Centre (RMSC); Northern Savannah; High Forest Zone; Coastal Savannah; and College of Renewable Natural Resources (CRNR) (Africa Development Fund, 2002).

Furthermore, the Forestry Plantation Development Centre (FPDC), a semi-autonomous agency under the Ministry of Lands and Forestry (MoLF) was mandated to plan, co-ordinate, advise and inform stakeholders, promote plantation development by small-medium investors, and large-scale investors, and to seek funds for plantation development under the Natural Resources Management Programme[1] (NRMP) (Africa Development Fund, 2002). In Ghana's case, primary responsibility for all forest activities remained within one ministry. This vertical structure ensured that policies were well integrated and coordinated among branches of MoLF in a hierarchical manner. However, this structure did not ensure horizontal policy integration, that would result in coordination among other relevant ministries for policy implementation.

3.7. Investment in Forest Rehabilitation

The Forest Authority in Ghana has not been able to adequately monitor and patrol forests contributing to bush fires and large-scale encroachment on the forest reserves. Inadequate funding for forest authority operations has significantly impacted their ability to be effective. Lack of funding has resulted in shortages of equipment and personnel making it extremely difficult to control widespread illegal logging (Agyarko), 2019).

Inadequate investment in reforestation measures can have a significant deterring impact on successful forest transition. For example, shortages in investment lead to rapid resource depletion as demand surpasses available supply of resources like timber (Andoh & Lee, 2018). Historically, in Ghana, the private sector failed to invest in timber plantations for decades resulting in an extreme over-exploitation of available timber resources due to the demand for raw materials (Oduro K. A., 2016).

In 2000, the Forest Plantation Development Fund Act established the Forest Plantation Development Fund. This Act stated that financial sources for the fund include: "the proceeds from the timber export levy imposed under the Trees and Timber Act; grants and loans given to encourage investment in forest plantation; grants given by international environmental bodies and other institutions to assist forest plantation development projects with social and environmental benefits; money to support forest plantation development; funds provided by Parliament from the Consolidated Fund; and, money from any other source approved by the Minister of Finance" (Article 4) (The REDD Desk, 2019).

According to this Act, this Fund is to be governed by a "board consisting of a chairman (someone involved in the plantation industry), the chief director of the Ministry of Lands and Forestry, two representatives from other institutions involved in the plantation industry, a representative of tree growers, a representative of the Fund Management Bank, and a representative from a donor or financial agency contributing to the fund" (Article 6) (The REDD Desk, 2019). Through this Act, the government

attempted to create adequate funding for forest rehabilitation, and have it governed in a transparent and accountable manner. Though government funding was available through the reforestation plantation development fund, challenges remained. For example, implementation of certain projects was interrupted due to payments not being transferred on time which impacted the overall success of the project (Andoh & Lee, 2018). Furthermore, investment was particularly low in timber substitution hindering the achievement of energy substitution despite the existing legal frameworks (Oduro K. A., 2016).

Moreover, inadequate management of public forest plantations is partially due to inconsistent and insufficient funding. Important activities such as tending and thinning were dependent on the availability of funds leading to significant delays. Many forest plantations also faced degradation due to forest fires, especially in the Savannah and Dry Semi-Deciduous Forest Zones. Forest fires were ill managed partially due to budgetary constraints that impacted the effectiveness of forest fire management practices (Forestry Commission, 2017).

3.8. Policy Comparison between Ghana and Korea

Boon et al. summarize the main challenges in forest resource management in Ghana, including a very complex land tenure system, the conversion of forests to farmlands, a skewed benefit-sharing mechanism, weak institutional and governance structures, and ineffective involvement of relevant stakeholders. They also highlighted that "lack of political will and commitment, weaknesses in the implementation and enforcement of laws and standard practices, and lack of transparency" resulted in unsustainable harvesting of forest resources and illegal logging. Overall, it seems many of the activities outlined in the Forest and Wildlife Policy of 1994 were unattainable because they were beyond the capacity of one single organization to manage effectively (Boon, Ahenkan, & Nakuku Baduon, 2009) .

This paper comes to similar conclusions when comparing these two cases. Both Ghana and Korea had similar objectives for forest rehabilitation. In Ghana, the Forestry Commission (FC) implemented and coordinated the National Forest Plantation Development Programs to restore denuded lands, meet future demands for industrial timber, create job opportunities, reduce poverty and increase food production. In Korea, the National Forest Plans, similarly focused on restoring degraded forestlands, establishing plantations to satisfy the growing demand for timber resources, erosion control, forest protection, and recreation (Andoh & Lee, 2018).

Policies implemented under the National Forest Plantation Development Program contributed to improving forest cover in Ghana and in restoring certain denuded areas. Total forest area increased from 37% in 1990 to 41% in 2015 (Andoh & Lee, 2018). However, policies were not implemented effectively as expected and many goals remained unfulfilled including the control of timber production and prevention of illegal logging. Policy integration in Ghana was primarily vertical as the Ministry of Lands and Forestry through the Forest Commission (FC), Forest Service Department and private developers implemented strategies for reforestation. It can be argued that greater coordination between ministries on a horizontal level could have resulted in more effective implementation.

Table 3. Objectives of the national forestation plans

Countries	objectives
Ghana(NFPDPs)	• Restore the forest cover of degraded forest reserves • Address wood deficit situation in the country, especially timber and fuelwood consumption • Create employment opportunities at the rural community level to increase rural household income • Increase food production in the country
ROK(NFDPs)	• Post-war forestland recovery and wood supply (1953-1972) • Forest rehabilitation (1973-1997) • Sustainable forest management (1998-2013)

Source: Jewel Andoh, Yohan Lee. Forest transition through reforestation policy integration: A comparative study between Ghana and the Republic of Korea p.19

Whenever horizontal and vertical approaches were being utilized together, policy implementation was more successful. For example, the Forestry Commission under the Ministry of Lands and Natural Resources and the Tema Oil Refinery (TOR) under the supervision of the Ministry of Energy, collaborated to address the rate of deforestation in the country through energy substitution. The FC "established control measures, such as imposing export levies to reduce exploitation of tree species in the forest reserves. The TOR implemented the LPG campaign to raise awareness of the negative environmental impact of the use of charcoal and firewood. This campaign significantly increased the use of LPG fuels in Ghana" during that time (Andoh & Lee, 2018).

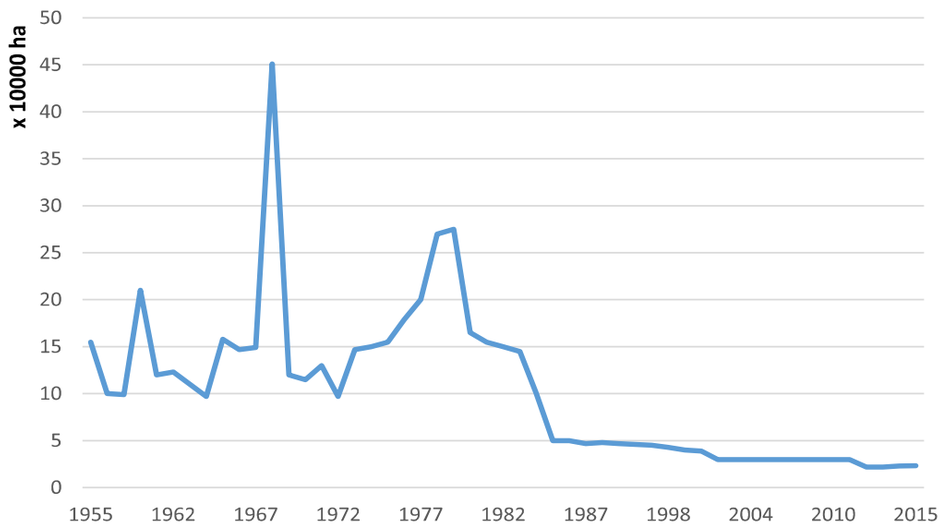

Figure 2. Changes in newly planted forest area from 1955 to 2015 in the ROK

Source: Jewel Andoh, Yohan Lee. Forest transition through reforestation policy integration: A comparative study between Ghana and the Republic of Korea p.16

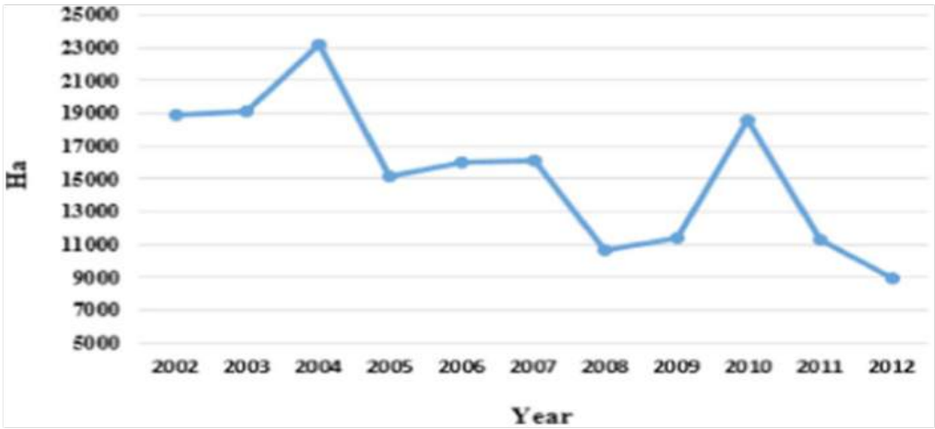

Figure 3. Newly planted forest area in Ghana under the various schemes from 2002 to 2012

Source: Jewel Andoh, Yohan Lee. Forest transition through reforestation policy integration: A comparative study between Ghana and the Republic of Korea p.17

Despite similar objectives and strategies, there was a greater degree of integration in Korea, especially on the horizontal level. For example, the National Forest Plans were horizontally integrated with national economic and development plans as reforestation was carried out as part of land management and economic development (Andoh & Lee, 2018). There was greater coordination between national ministries, for energy substitution, timber control and inclusive forestry. Energy substitution is an excellent example of this coordination as the Ministry of Home Affairs supported energy substitutions efforts by helping citizens remodel their kitchens to use coal instead of fuelwood. While the Ministry of Commerce and Industry focused on increasing coal output, it worked with the Ministry of Agriculture and Forestry to prohibit the shipment of fuelwood to urban areas. However, it seems recent there is a recognition in Ghana on the importance of greater integration and horizontal cooperation, since the *Ghana Forest Plantation Strategy 2016-2040* includes greater cooperation between the Ministry of Lands and Natural Resources with other ministries such as the Ministry of Finance and Economic Planning and Ministry of Food and Agriculture (Forestry Commission, 2017).

3.9. Additional Factors

The policy integration approach proved to be effective in both cases with varying degrees of success. There are other factors that contribute to differences in outcome, such as higher rates of economic growth and urbanization in Korea. Along with factors such as public awareness, political commitment, organizational reform and financial investment.

Public awareness is a significant aspect of reforestation, especially as a tool to discourage illegal logging, illegal felling and slash-and-burn agricultural practices. This is especially important for Ghana since majority of land is owned by local communities and traditional authorities and cooperation with companies logging illegally is a significant problem (Africa Development Fund, 2002)

Political commitment at the highest levels of government and the constant reinforcement of that commitment was a significant factor for success in Korea. This commitment resulted in the prioritization of reforestation and sustainable forestry practices, leading to high levels of investment and effective coordination between ministries.

Organizational reform or restructuring also did not take place in Ghana during the implementation of the NFPDPs. In contrast, in Korea, organizational reform took place and was based on the changing demands and objectives of forestry policies. The Korea Forest Service was transferred between ministries based on administrative needs for effective implementation (Andoh & Lee, 2018).

Another key difference between Korea and Ghana is related to forest ownership. In Korea, majority of the forests are owned by private owners while in Ghana, majority of the forests are owned by communities and tribal communities. Due to these differences, approaches to forest policy need to be contextualized based on the existing challenges.

In Korea, the government found methods to negotiate with private owners through different schemes and cooperatives. For example, during the First Ten-Year Forest Rehabilitation Plan, the Korea Forest Service established a policy fund for forest owners with substantial amount of forest land (20 ha). The owner would be designated as an ardent forester and the fund would support them (with low interest, long-term loans) as they pursued reforestation on their land. The Korea Forest Service (KFS) designated majority of these members as ardent foresters and designated 397 people as ardent foresters in the programs first year (1974). Furthermore, it was agreed that harvesting activities would allow the owner to keep 90% of the income and 10% would go to the government. Accordingly, forest owners formed a cooperative called the Korea Forestry Cooperatives Federation as means to organize and effectively communicate with the KFS (Lee, 2013).

In Ghana, forests have many classifications, including, forest reserves, off-reserve forests, communal forests, community plantations, private/individual plantations and institutional plantations. Forest ownership is derived from the system of land inheritance. There are two forms of inheritance: the patrilineal system and the matrilineal system. Due to different historical settings of these two systems, they have different concepts of land, land acquisition and land ownership. Institutional arrangements have been established to address the complex problems associated with forest ownership, resource tenure and their collective impacts on forestry and poverty reduction. However, the complexities related to ownership continue to impact management, regulation enforcement and compliance in Ghana (Boakye & Baffoe, 2006).

In Korea, there was greater clarity around forest ownership which allowed negotiations and subsequent policies to be clearer than Ghana's case, as the starting point was less complex for policymakers. Despite these significant differences, there are many similarities between the two cases and lessons can be learned from both, especially in terms integration and implementation strategies.

Ghana has developed concrete policy objectives and plans for forest rehabilitation, like Korea. However, the primary barriers to successful forest rehabilitation are challenges related to the enforcement of policies and regulations. These challenges are founded on inadequate financial investments, lack of institutional capacity and minimal coordination among ministries. Additionally, stronger political commitment and public awareness is needed to address these challenges.

4. Conclusion and Implications

The Republic of Korea has exhibited a truly amazing forest transition, planting approximately 11 billion trees from 1973 to 2008. This effective and rapid transition can be attributed to several factors such as strong political will, an integrative policy approach and the practice of inclusive forestry.

Strong political will among leadership is integral to a challenge of this magnitude, as it allowed policymakers and practitioners to take a long-term perspective and develop a coherent vision with specific goals and milestones that were then supported by high levels of financial investment. Korea displayed a synergy of horizontal integration and vertical integration approaches. National ministries coordinated policies based on their comparative advantage, allowing for a holistic approach that created a synergy between environmental and economic concerns. Specific objectives included energy substitution, controlling the supply and demand of timber, increasing rural incomes and community forestry. Community involvement was integral to successful reforestation as it not only provided tangible economic benefits for citizens and fulfilled labour demand for the government but also created a sense of ownership by appealing to citizen's patriotism. Korea's reforestation experience has various applicable lessons for countries formulating forestry policies and reforestation activities. It also has an overarching message that emphasizes the importance of how to structure policy from the onset.

While the Korean experience was unique for its time, it certainly offers lessons on institutional coordination mechanisms that may or may not work. Korea's case demonstrates the importance of policy integration for successful reforestation especially the importance of coordination between national-level ministries. Coordination between ministries allows them to use their expertise and comparative advantage to contribute to larger policy objectives. For example, in Korea, the government recognized that to decrease the demand on timber, changes needed to made to the construction sector. Therefore, the Ministry of Construction refused construction permits for buildings and for entertainment facilities deemed unnecessary. While the Ministry of Commerce and Industry focused on increasing the production and distribution of cement as an alternative construction material effectively lowering the consumption of timber for construction purposes (Park & Youn, 2017). Along with increasing effectiveness, through collaboration, ministries can avoid duplication and avoid contradictions during the formulation of policy and regulation. This experience also emphasizes the importance of mechanisms for institutional coordination including intragovernmental meetings and direct involvement of leadership.

The comparative case study with Ghana reinforces the significance of integrative policy approaches and how degrees of integration can impact implementation. This comparison supports the argument that a synergized approach that utilizes both horizontal and vertical approaches results in more effective implementation. In terms of practical applications for countries pursuing forest rehabilitation, the Korean case provides examples of various schemes and projects such as community forestry programs, public awareness campaigns, pest and fire control mechanisms and plantation practices. These examples can possibly be adapted to a given country-context, as appropriate.

5. References

Africa Development Fund. (2002). *Community Forestry Management Project -Republic of Ghana.* Appraisal Report.

Agyarko, T. (n.d.). *Forestry Outlook Study for Africa (FOSA) Ghana.* Ministry of Lands and Forestry. The Food and Agriculture Organization (FAO). Retrieved 10 01, 2019, from The Food and Agriculture Organization (FAO): http://www.fao.org/tempref/docrep/fao/003/AB567E/AB567E00.pdf

Andoh, J., & Lee, Y. (2018). *Forest transition through reforestation policy integration: A comparative study between Ghana and the Republic of Korea.* Forest and Economics , 12-21.

Bae, J., Rin , W., & Kim , Y.-S. (2012). *Forest Transition in South Korea: Reality, path and drivers.* Elsevier, 198-207.

Bae, J. S. (2014). *Lessons learned from the Republic of Korea's National Reforestation Programme.* Federal Ministry for the Environment Nature Conservation, Building and Nuclear Safety (Germany). Daejeon: Korea Forest Service.

Boakye, K., & Baffoe, K. (2006). *Trends in Ownership, Forest Resource Tenure and Instituional Arrangments: Case Study From Ghana.* Food and Agriculture Organization.

Boon, E., Ahenkan, A., & Nakuku Baduon, B. (2009). *An Assessment of Forest Resources Policy and Management in Ghana.* 29th Annual Conference of the International Association for Impact Assessment.

Broni-Bediako, E., & Amorin, R. (2018). *The Ghana Liquefied Petroleum Gas Promotion Programme: Opportunities, Challenges and the Way Forward.* Innovative Energy and Research.

Convention on Biological Diversity . (2019). *History of the Convention.* Retrieved 10 08, 2019, from Convention on Biological Diversity : https://www.cbd.int/history

Deli Zhai, J. X.-V. (2017, 05). *Lost in transition: Forest transition and natural forest loss in tropical China.* Plant Diversity, 149-153.

Department of Agriculture, Food and Rural Affairs, Government. (2019). *History.* (F. a. Department of Agriculture, Producer) Retrieved 09 10, 2019, from Department of Agriculture, Food and Rural Affairs, Government: http://www.mafra.go.kr/mafra/369/subview.do

Eshun, J., Potting, J., & Leemans , R. (2010). *Sustainability of forestry and timber industry in Ghana.* The International Forestry Review, 383-395.

FAO . (2015, 10 15). *Agroforestry-Definition.* Retrieved 09 20, 2019, from The Food and Agriculture Organization (FAO) of the United Nations: http://www.fao.org/forestry/agroforestry/80338/en/

Forestry Commission. (2017). *Ghana Forest Plantation Strategy 2016-2040.* Forestry Commission.

Gabay, M., & Rekola, M. (2019). *Forests, peaceful and inclusive societies, reduced inequality, education, and inclusive institutions at all levels.* United Nations Forum on Forests. United Nations Forum on Forests.

Gyamfi Asiedu, K. (2019, 05 10). *Ghana is losing its rainforest faster than any other country in the world.* Retrieved 10 01, 2019, from World Economic Forum: https://www.weforum.org/agenda/2019/05/ghana-is-losing-its-rainforest-faster-than-any-other-country-in-the-world/

International Institute for Sustainable Development (IISD). (2011, Oct 24). *Summary of the Tenth Meeting of the Conference of the Parties to the UN Convention*

to Combat Desertification. Retrieved Oct 2019, from International Institute for Sustainable Development (IISD): https://enb.iisd.org/vol04/enb04241e.html

KDI School of Public Policy and Managment. (2012). *Comprehensive one-stop references on key development issues of Korea*. Retrieved 09 09, 2019, from K-Developedia: https://www.kdevelopedia.org/themeSub.do?themeMainId=4

Kim, J., Jo, H., Kim , H., Kim, S., Chowdhury, S., & Son, Y. (2017). *Sustainable Development Goals Policy Brief Series No. 2 Sharing Korea's Development Experience in Sustainable Forest Management: Focusing on Experimental Forests in Jeju Island.* UNDP Seoul Policy Centre. Seoul: UNDP Seoul Policy Centre.

Kim, S., & Son, Y. (2019). *Sustainable Development Goals Policy Brief Series No.10 Sharing Korea's Experience in Sustainable Forestry: Possible Applications in Developming Countries*. Seoul: United Nations Development Programme Seoul Policy Centre.

Korea Forest Service. (2019). *Forest Sustainability Index*. Retrieved 10 08, 2019, from Korea Forest Service : http://english.forest.go.kr/newkfsweb/html/EngHtmlPage.do?pg=/esh/sfm/UI_KFS_0103_040000.html&mn=ENG_03_04

Korea Forest Service. (2010). *Forestry History*. Retrieved 09 15, 2019, from Korea Forest Service: http://english.forest.go.kr/newkfsweb/html/EngHtmlPage.do?pg=/esh/koforest/UI_KFS_0101_020100.html&mn=ENG_01_02_01

Korea Forest Service. (2010). *The 4th National Forest*. Retrieved 09 20, 2019, from Korea Forest Service: http://english.forest.go.kr/newkfsweb/html/EngHtmlPage.do?pg=/esh/policy/UI_KFS_0102_010400.html&mn=ENG_02_01_04

Korea Forest Service. (2010). *The 5th National Forest Plan*. Retrieved 09 20, 2019, from Korea Forest Service: http://english.forest.go.kr/newkfsweb/html/EngHtmlPage.do?pg=/esh/policy/UI_KFS_0102_010500.html&mn=ENG_02_01_05

Korea Forest Service. (2019). *The Sixth National Forest Plan*. (K. F. Service, Producer) Retrieved 09 20, 2019, from Korea Forest Service: https://www.forest.go.kr/kfsweb/kfi/kfs/cms/cmsView.do?mn=NKFS_01_04_02&cmsId=FC_000349

Lee, K. J. (2013). *Successful Reforestation in South Korea: Strong Leadership of Ex-President Park Chung-Hee.*

Markandya, A., Son, Y., & Lee, W.-K. (2017). *Sustainable Development Goals Policy Brief Series No. 1, Valuation of Reforestation in Terms of Disaster Risk Reduction: A Technical Study from the Republic of Korea.* Policy Report, UNDP Seoul Policy Centre.

McNeill, J., & Engelke, P. (2014). *The Great Acceleration: An Environmental History of the Anthropocene since 1945.* Harvard University Press.

Mikaela, W., & Dow Goldman, E. (2019, 04 25). *The World Lost a Belgium-sized Area of Primary Rainforests Last Year.* Retrieved 10 01, 2019, from World Resources Institute.

Ministry of Agriculture, Food and Rural Affairs. (2019). *History*. (F. a. Ministry of Agriculture, Producer) Retrieved 10 08, 2019, from Ministry of Agriculture, Food and Rural Affairs: http://www.mafra.go.kr/english/751/subview.do

Ministry of Lands & Natural Resources. (2016). *Framework on Tree Tenure and Benefit Sharing Scheme.* Government of Ghana , Ministry of Lands & Natural Resources. Ministry of Lands & Natural Resources.

Ministry of the Interior and Safety. (2019). *History.* (M. o. Safety, Producer) Retrieved 09 11, 2019, from Ministry of the Interior and Safety: https://www.mois.go.kr/eng/sub/a02/history/screen.do

Ministry of Trade, Industry and Energy. (2016). *History.*

Retrieved 09 09, 2019, from Ministry of Trade, Industry and Energy: http://www.motie.go.kr/motie/mi/me/history/history.jsp

Oduro, K. A. (2016). *Ghana's high forests: trends, scenarios and pathways for future developments.* Wageningen University. Wageningen: Wageningen University.

Oduro, K., Mohren, G., Pena-Claros, M., Kyereh, B., & Arts, B. (2015, 05 20). *Tracing forest resource development in Ghana through forest transition pathways.* Land Use Policy, 48, 63-72.

Park, M. S., & Youn , Y.-C. (2013). *Development of urban forest policy-making toward goverance in the Republic of Korea.* Urban Forestry and Urban Greening, 273-281.

Park, M. S., & Youn, Y.-C. (2017). *Reforestation policy intergration by the multiple sectors towrd forest transition in the Republic of Korea.* Forest Policy and Economics, 45-55.

Rayner, J., & Howlett, M. (2009). *Introduction: Understanding integrated policy strategies and their evolution.* Policy and Society.

Sunshine, W. L. (2019, 08 01). *All About Anthracite Coal.* Retrieved 09 20, 2019, from The Balance: https://www.thebalance.com/what-is-anthracite-coal-1182544

The Forestry Commission of Ghana. (2019). *National Forest Plantation Development Programme.* Retrieved 10 01, 2019, from The Forestry Commission of Ghana: https://www.fcghana.org/page.php?page=291&section=28&typ=1

The Korea Herald (2016). *Korea wins bid to host World Forestry Congress 2021. 8 Dec.* http://www.koreaherald.com/view.php?ud=20161207000520. Last accessed 20 Nov 2019.

The REDD Desk. (2019). *Forest Plantation Development Fund Act.* Retrieved 10 10, 2019, from The REDD Desk: https://theredddesk.org/countries/laws/forest-plantation-development-fund-act

The World Bank. (2019, 09 16). *Overview.* Retrieved 10 01, 2019, from The World Bank: https://www.worldbank.org/en/country/ghana/overview

UN Environment. (2019). *Why do forests matter?* Retrieved 2019, from https://www.unenvironment.org/explore-topics/forests/why-do-forests-matter

United Nations Archives. (2017). *Fonds United Nations Korean Reconstruction Agency (UNKRA) (1950-1958).* Retrieved 9 4, 2019, from United Nations Archives: https://search.archives.un.org/united-nations-korean-reconstruction-agency-unkra-1950-1958

United Nations Photos. (2009). *UNKRA Improves Coal Mining Methods in Korea*. Retrieved from https://www.unmultimedia.org/s/photo/detail/188/0188959.html

United Nations Photos. (2009). *UNKRA Sparks Increased Coal Production in Korea*. Retrieved from https://www.unmultimedia.org/s/photo/detail/188/0188783.html

World Bank. (2019). *Urban population (% of total population) - Ghana*. Retrieved 11 01, 2019, from World Bank Data : https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?end=2018&locations=GH&start=1990

World Bank. (2019). *GDP per capita (current US$) - Korea, Rep., Ghana*. Retrieved 11 01, 2019, from World Bank Data: https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?end=2015&locations=KR-GH-JP&start=2015&view=bar

Yoo, B., Kim, C. S., Jeon, J. H., & Lee, H. S. (2014). *Forest Resource Development in Korea.* Korea Forest Service, Korea Forest Research Institute (KFRI). Ministry of Strategy and Finance, Republic of Korea.

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