



global warming arbor day

tending to forests  
impacted by changing climate



서울환경운동연합



Friends of  
the Earth



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## tending to forests impacted by changing climate

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**The Korean Federation for Environmental Movement(KFEM)** is one of Asia's largest NGOs consisting of 50 local offices, 6 institutes and 85,000 cumulative members. We seek to create a sustainable world for our future generation not only by watching over the current environment but also by establishing viable visions and alternatives for a new environmental age. We also pursue internationally cooperative activities as a member group of the Friends of the Earth International.

**Our vision** is a world which has overcome the current destructive way of life created during industrialization and where man and nature harmoniously coexist. We oppose war and violence and seek a peaceful and fair future society. We hold as our core values life, peace and participation to create a sustainable future with our fellow world citizens.

**Our local offices** are at: Seoul / Gangnam-Seocho / Gangsoe-Yangcheon / Gangdong-Songpa, Gyeonggi, Goyang, Gwacheon, Seongnam, Suwon, Siheung, Ansan, Anyang-Gunpo-Yeuwang, Yeosu, Osan, Yeujungbu-Yangju-Dongducheon, Yichun, Paju, Hwasung, Sokcho-Gosung-Yangyang, Chuncheon, Wonju, Hyeongsung, Jaechon, Chungju, Choongju, Dangjin, Seosan-Taeon, Cheonan-Asan, Gyeongju, Pohang, Masan-Changwon-Jinhae, Sachun, Jinju, Tongyeong-Gujae, Iksan, Jeonju, Gwangyang, Mokpo, Bosung, Suncheon, Yeosu, Jangheung, Jeju, Gwangju, Daegu, Daejeon, Busan, Ulsan and Incheon. (Please contact the KFEM secretariat or check [www.kfem.or.kr](http://www.kfem.or.kr) for local group's contact info)

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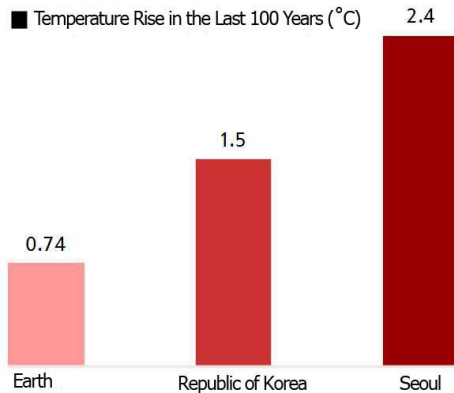
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## one Why Global Warming Arbor Day?

Where do you go for some fresh air and relaxation in Seoul? Is there a park or wetland you can walk to in 15 minutes? Some may have said “yes” to such as question 30 years ago, when roads and building took up only 30% of the entire Seoul district. Urban grounds have rapidly replaced forests and brought out a warmer climate and atmospheric pollution.

Global warming has hit Seoul hard. Temperature rise for the past 100 years in Seoul is at 2.4°C, triple that of the global average.



The National Arbor Day (April 5th) was set to match times when the ground would thaw. But average temperatures on this day have increased 3.0 °C in the past 80 years. This means we need to plant trees about 8 days ahead. Deforestation and urbanization has triggered global warming, which in turn has changes plant climate zones.

■ Seoul District Arbor Day (April 5th) Climate Change (°C)

	Early 30-year Average (1960-1990)	Recent 30-year Average (1979-2008)	Difference
Ave. Temp.	8.0	11.0	+3.0

KFEM Seoul proposes that we call this the ‘Global Warming Arbor Day’ and jointly tend to our forests. Planting trees and raising gardens in nearby areas can help prevent global warming. March 27th of this year will mark the beginning of our efforts.

## two Bukhansan (Bukhan Mountain) Forest Restoration



Bukhansan is a National Park sporting 5 million annual visitors; it holds the Guinness World record for the most visitors per surface area. Bukhansan provides numerous resting spots to visitors, but excessive access has taken its toll on its ecosystem. According to the National Park Service, Bukhansan has 300 unapproved bypaths in addition to 70 designated paths.

Artificial bypaths erode the soil that supports vegetative roots and hinder flora and fauna habitats. This year we will plant trees on such violated bypaths to restore a part of the Bukhansan forest ecosystem. This will become an opportunity for visitors who've used bypaths in the past to realize that Bukhansan's forests need to be properly preserved.

### Use of Local Trees and Soil

In our Global Warming Arbor Day activity we will restore upset soil and roots using ecological means. We'll be using pine trees, one of Bukhansan's major tree species, and local soil to restore this site.

**Pine trees** are an important coniferous species that is grown on 1.5 million hectares nation-wide. In order for trees to properly function as 'CO2 sink' they must survive for long durations of time. 30 year old pine trees in mid-Korea can absorb 7.68 tons of CO2 per year.

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### three how forests regulate climate

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The greenhouse effect is a natural phenomenon. Greenhouse gases like CO<sub>2</sub> create a “blanket” effect so that lifeforms may continue living on Earth. But excess greenhouse gas created artificially has increased atmospheric greenhouse gas concentration by 35% compared to pre-industrialization eras. Because of this, more and more reflected solar radiation gets trapped in the atmosphere, aggravating global warming and causing climate change.

Carbon cycles on Earth are crucial to the greenhouse effect; massive amounts of carbon undergo natural discharge, absorption and storage cycles. It is estimated that roughly 200 million tons of carbon is exchanged between ocean bodies and land masses. Carbon is stored in numerous ways including coal, oil, oceanic and vegetative organic matter.

#### vegetation and soil absorb carbon regulating the climate

Plants and other vegetation change CO<sub>2</sub> into carbon in the process of photosynthesis. Carbon is stored as a biological resource in trees and oxygen is returned into the atmosphere. Some of this carbon passes through the roots or



is decomposed after the tree dies to return to the soil. In other words, carbon is stored in trees and forest soil.

But if vegetative photosynthesis and respiration isn't stable, carbon will accumulate in the soil or be discharged into the atmosphere. Current global vegetative matter and soil store 2.3 trillion tons of carbon.

Recent studies have shown that on average, one billion tons of atmospheric carbon were absorbed annually into vegetation and soil throughout the 1980s and 1990s. In other words, the Earth's vegetation, including forests, act as massive carbon storage sites.

### energy use and deforestation: carbon source rather than sink

But the larger picture shows that more stored carbon is being released into the atmosphere. The primary reasons are that we are using up stored carbon (coal, oil, gas) and changing land use (deforestation). More carbon is being released into the atmosphere than carbon absorbed into forests and oceans combined.

energy supply	25.9%
industry	19.4%
forestry	17.4%
agriculture	13.5%
transportation	13.1%
Residential and commercial buildings	7.9%
Waste and waste water	2.8%

#### CONTRIBUTION TO ANTHROPOGENIC GHG EMISSIONS IN 2004 IN TERMS OF CO<sub>2</sub>-EQ

Massive deforestation is continuing under the purposes of expanding agriculture, biofuel, timber, pulp and paper industries. Land-use change and timber industries take up 24% of CO<sub>2</sub> discharge and 18% of total greenhouse gas discharge. The IPCC has stated that forestry has the third highest greenhouse gas discharge after energy use and industry.

**“Curbing deforestation is a highly cost-effective way of reducing greenhouse gas emissions and has the potential to offer significant reductions fairly quickly.”**

- Stern Review on the Economics of Climate Change

Forest vegetation store an estimated 300tons of carbon per hectare. Troipcal rainforest vegetation hold 60% of total forest vegetation-held carbon.

But it should be noted that most tree-absorbed carbon do return to the atmosphere. This happens when trees die and decompose and when wooden products are burnt or left to rot. If trees decompose in landfills, carbon is emitted in the form of methane, which is a greenhouse gas 21 times more potent than CO<sub>2</sub>. If timber or paper is recycled and its use extended, we can slow the process where stored carbon is re-emitted into the atmosphere.

Forest soil also stores massive amounts of carbon. Organic matter like fallen leaves and rotting trees decompose at forest bottoms. Over two thirds of forest ecosystem carbon is stored in soil and related to peat deposits. This is especially evident in high elevation where organic matter decomposes slower or in tropical peat deposits where decomposition is hindered by anaerobic conditions.

During harvests forest soil ecosystems are disrupted and emit considerable amounts of carbon into the atmosphere. This is because of heavy machinery movements and changing light and water conditions. Forest soil also emit carbon if fertilizer is applied.



#### Did you know?

Key countries responsible for LUCF(land use change and forestry) emissions include Indonesia (34%), Brazil (18%), Malaysia, Myanmar and the Democratic Republic of Congo. If developing countries are considered as a group, LUCF CO<sub>2</sub> emissions make up one third of their total emissions. Industrialised countries, including the EU and the US, have negative LUCF emissions, but this is primarily because their forests have already been cleared and because of current re-growth.

## four **how climate change affects forests**

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How the Earth's forest and climate are interlinked is very complicated and hard to predict. For example, growing saplings are reacting differently to the changing climate than are fully grown trees. Such factors add uncertainties to research carried out with grown trees.

Climate change affects forests as CO<sub>2</sub> levels rise and climate and rainfall change. This not only changes the ability of forests to store carbon but also the forest ecosystem as a whole. The entire forest is affected from extreme climate conditions as forest tree distribution is changed. The severity of such effects are largely dependent on how much the temperature rises.

The ability of forests to absorb and store carbon is closely related to the climate. According to recent studies, forests worldwide can serve as carbon sink for the remainder of the 21st century if temperatures rise is maintained below 2°C. But if temperature rises between 2°C and 3°C, forest carbon storage effects will briefly rise until the year 2100 and stop (however, this conclusion has been questioned statistically).

'Carbon fertilization' is a concept that claims that increase in atmospheric carbon will positively influence photosynthesis and help vegetative growth. Whether this speculation is fact or not is critical to determining how we should mitigate climate change. But researches so far have largely resulted in ambiguity.

Currently, the only viable conclusion is that carbon fertilization should not be our basic premise in mitigating climate change due to its uncertainties. Additional research must be conducted, and if this concept is true we must also find out how this will impact climate change.

### **climate change triggers forest fires and extream weather**

Increases in forest fires are heavily damaging the ecosystem. Fires consume everything including vegetation, fallen trees, soil organic matter and forest

animal life.

Climate change is again an important factor here. Hotter, drier conditions worsen fire damages in terms of both frequency and severity. Incorrect land-use such as plantation (which are drier than forests) and some agricultural and forestry practices are the causes here. Natural fires are increasing in the Amazon; it has also experienced severe droughts in 2005, 2006 and 2007. In 2005 Southwestern Amazon saw its first major fire that reached over 2800 square miles. In the past 20 years major forest fire losses were also seen in such countries as Brazil, China, Indonesia (on the islands of Kalimantan and Sumatra), Mexico and Paraguay.



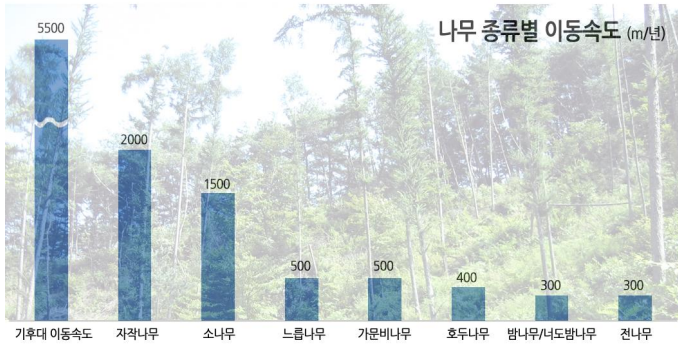
Extreme weather is becoming more frequent and severe due to climate change and once again damaging the forests. The IPCC (Intergovernmental Panel on Climate Change) states that “these phenomena are often very localized and occur in short time periods but cause long-term economical impacts. There is evidence that such extreme weather has aggravated recent damages.” Weather conditions like hurricanes, tornadoes, extreme droughts and rainfall, floods and snowstorms are such examples.

For example droughts will critically affect forests. The Food and Agriculture Organization (FAO) states that “plants have a considerable ability to adapt to changing conditions and can tolerate even extremely high temperatures, provided sufficient water is available”

### threat to trees in Korea

Global warming also changes Korean tree species distribution. Increasingly hot

climates cause trees to move North and up to higher elevations to survive. But the speed at which trees can travel through reproduction can't match that of climate zone changes. Trees may move to mountaintops to seek cooler conditions but higher elevations are also being affected by global warming.



Trees that used to inhabit polar zones are being replaced by trees from temperate zones. According to the Ministry of the Environment, the Korean Fir (*Abies koreana*), one of

the most abundant polar zone coniferous trees of Hallasan, decreased 34% between 1967 and 2003. Korean Fir used to take up 30% of all Hallasan areas over 1000m in elevation but now only take up 19.9%. On the other hand, areas where coniferous trees and broad-leaved trees are mixed have increased 7%. Areas where the Korean Fir have died out are being rapidly overtaken by Japanese Oak (*Quercus crispula*).

As global warming will affect northern regions faster than trees can move, many native tree species are expected to wither out. Trees can move an average of 250m per year through reproduction, but the IPCC projects that warming temperature zones move at 1500~5500m per year. Even relatively fast-traveling tree species like the Korean Fir cannot completely overcome climate change. And should urban areas block migrating tree populations movement becomes impossible.

**“The speed at which native species are driven to extinction due to climate change is projected to be much faster than that at which natives species can spread out due to climate change.”**

-Jin-oh Hyun, President of the Northeast Vegetation Research Institute

## five What We Can Do For Forest Protection

### plant Trees

First take a look around your house and neighborhood. Discuss tree-planting with your neighbors. Any place where people can easily access is fine. Approachable places like libraries, schools, playgrounds, roads can be continuously maintained.



### raise a garden

Arbor Day's NOT just about planting trees. Try growing your own vegetables at home or a nearby compost garden. Don't leave rooftops and verandahs as 'dead space'; they can become great vegetable gardens with enough sunlight. If you don't have enough space try using a garden box.

### preserve paper

- Think carefully about what you print and recycle paper.
- Reuse envelopes. Wrinkled envelopes or envelopes with writing are reusable too.
- Use handkerchiefs instead of tissues and clothes instead of paper.
- Use shopping bags made of cloth, not vinyl or paper.

Source: <Paper Trails>



paper clock | papers we use a day

### share global warming arbor day

Spread awareness of the Global Warming Arbor Day to those around you and come for more activities with KFEM Seoul this year. Share your memories with your friends. Just as trees gather to form a forest, individual people can gather to make our cities greener.

## Can you feel big pride of 85 thousands?

**“Join us. Become a member.”**

You must be so used to such comments. But they represent the largest driving force behind today's KFEM. KFEM was the first organization in Korea to operate around small donations and membership fees from citizens in the 1990s.



**Long-billed Ringed Plover** *a bird under threat of extinction due to 4-Rivers project*

KFEM was able to maintain itself throughout numerous issues because it was rooted on citizen participation and support. With whom shall we prevent environmental destruction? Who should we ask for help and wisdom in dealing with the world's climate crisis? We would like to answer, YOU.

Our members are our largest pride. We're working with 85,000 members from Jeju to Seoul to create a world where life and peace are truly appreciated. We'd like to extend our hands to even more people who wish to conserve the environment. Won't you join us?

**“I appreciate very much the great work KFEM is doing in defense of the Korean (and global) ecosystems and on climate change. As we stand together in the struggles we will surely build a better world, with better memories and with a better future.”**

- Nnimmo Bassey, Chair, Friends of the Earth International