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Dangerous Change

Climate impacts threatening Japan today and tomorrow

A country in the midst of change

As global carbon dioxide emissions continue to burgeon, countries like Japan are already feeling the heat of climate change impacts. Warmer temperatures and uncharacteristic weather patterns are disrupting ecosystems and threatening economic stability for some, and coastal homelands for others. WWF's recently released report, *Nippon Changes*, details the present and projected effects of Japan's changing climate based upon recent scientific findings, and takes a close look at the sub-arctic region of Hokkaido. The province is host to the 2008 G8 summit, an annual meeting of leaders from eight of the world's wealthiest nations. It remains to be seen how Japan will weather climate changes, but one thing is certain, neither man nor nature is exempt from its impacts.

Climate change is already happening

From warmer winters to more intense typhoons and thinning sea ice, once projected climate change impacts are already beginning to unfold in Japan. Over the past century Japan's average yearly temperature has increased by about 1 degree Celsius and some parts of the country are receiving much less rain and snow than years past. While global warming is drying up Japan in some cases, it is literally flooding the country in others—during the past century heavy rain events linked to frontal weather systems and typhoons have markedly increased.

But perhaps one of the most obvious and mourned changes to Japan's natural environment has been the depletion of drifting ice off the unspoiled Shiretoko peninsula, in the Sea of Okhotsk off the coast of Hokkaido. Sea ice around this UNESCO world heritage sight is visibly shrinking due to a confluence of events, one of which is climate change. Research confirms that over the past three decades the ice has melted at a rate of about 4 percent per year. And Hokkaido's winter tourists hoping to catch a glimpse of this popular natural attraction now have about 22 fewer days per year to see drifting ice than they did in years past.

But not just tourists are suffering from such losses. Locals participating in WWF's Climate Witness program, who have come forth to share their personal experiences with climate change, are as well. WWF Climate Witness and veteran nature photographer Kenji Ito says that despite 15 successful years of photographing sea ice, he did not manage to take one single picture of the winter sea completely covered by drifting ice in 2006-2007, and that there is much less ice now than in years prior.

A future bringing worse changes

Scientists predict that Japan's changing climate is on course for even more dramatic shifts than are presently occurring. By the close of this century, average temperatures are expected to rise by another 2 to 3 degrees Celsius, and by as much as 4 degrees in Hokkaido. Winter frost is slated to abate, with a projected decrease in annual frost days of 20 to 45 by 2090, primarily in Hokkaido and along the Sea of Japan.

As winters warm up in Japan, future summers are expected to be sultry. By 2100 average daytime temperatures could be as much as 4 degrees Celsius hotter than they are now, and the days exceeding 30 degrees Celsius could triple by 2100, to 100 days per year. It is possible that such drastic changes will disrupt the rhythm of the seasons in Japan, which would have far reaching cultural and socioeconomic impacts. The warmer seasons could see up to 20 percent more rainfall, along with more extreme weather events, like droughts and typhoons.

Along with elevated ambient temperatures, ocean temperatures will also heat up, and scientists predict that waters may warm by 1 to 6 degrees Celsius. A rise in sea-surface temperature of 2 to 4 degrees Celsius (relative to the current temperatures) has the potential to increase the intensity of tropical cyclones by as much as 20 percent. Not only will ocean temperatures rise but so will sea levels. Since 1993 sea levels along Japan's shorelines have been rising at a rate of 5.0 mm per year, and from 1970 to 2003 seas in Hokkaido rose by nearly double that (9.3 mm per year).

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Climate Witness

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Kenji Ito

Kenji Ito, a long-time resident of Hokkaido, has spent the past 15 years documenting the region's famously photogenic snowy landscapes and icy waters with his camera. But all of that may be changing. "In recent years I have seen a lot of changes in the environment of Hokkaido, making it harder to capture such winter scenes," says Ito.

Ito complains that warmer weather in the mountains is generating more wet snow than dry snow, presenting him with new difficulties. "Wet snow is troublesome for me, as it easily melts. Because of the changes in the snow conditions I need to stay in the mountains for at least a few weeks in order to take good winter pictures."

And Ito finds it increasingly challenging to camp out in the mountains. "I used to be able to spend the night in the mountains by making a bivouac, a kind of hut in the heavy snow. But because there is less snow, and the snow has become wetter, this is sometimes impossible."

Ito worries that his passion for winter photography will soon be a thing of the past. "I would not be surprised if my photos of the 'old' snowy landscapes around Hokkaido will soon be regarded as a documentary, to show people how Hokkaido's winters looked several years ago."

But it's not only Ito's professional life that has been disrupted by climate change, his winter leisure has suffered changes as well. "I used to enjoy skiing as a student in Hokkaido during the 1990s. But in recent years I have been unable to go skiing, because we are getting more and more rain instead of snow."

He says that the area surrounding his former home in Iwamizawa was once known for having the second heaviest snowfall in Hokkaido, but now it is getting less and less snow.

People and nature at serious risk

Man and nature are intimately linked to the environments in which they live. Even slight changes can have major ramifications, hence significant changes such as those observed and projected in Japan stand to seriously threaten the country's local communities and natural ecosystems. Japan's agriculture sector, human health, infrastructure, tourism, forest growth, wildlife migration patterns, fish stocks and cultural identity will all likely suffer from climate change impacts.

Threats to people

Climate Witness Katsuo Sasaki, an organic farmer with more than 40 years of experience growing rice, has been adapting his farming practices to deal with climate change for the past decade. "I am afraid my farm will no longer be suitable for producing rice in the next decades," says Sasaki. And he could be right—the agricultural sector is among those likely to be the most vulnerable to climate change induced impacts in Asia.

Rice yields are projected to decrease by up to 40 percent in irrigated lowland areas of central and southern Japan (if carbon dioxide concentration in the atmosphere doubles). Fruit crops will be degraded as well—and there are already reports throughout Japan of abnormalities in fruit, from grapes that will not ripen to peaches with brown flesh.

Alongside smaller volumes of locally produced rice and sub par fruit, locals may have to get used to less fish in their diets. Research shows that Japan may face a substantial decline in some fish catches over the 21st Century. Hokkaido waters will likely be among those most affected, primarily due to loss of drift ice, which will lead to smaller areas of sea algae, a primary link in the ocean food chain.

Climate Witness

Katsuo Sasaki is a Miyagi based organic rice farmer with more than 40 years of experience growing rice, and a firm advocate of living in harmony with nature, rather than abusing it. In recent years Sasaki has witnessed environmental changes that are forcing him to alter his farming practices—and he believes global warming is to blame. "I am afraid that my farm will no longer be suitable for producing rice in the coming decades," says a concerned Sasaki.

Miyagi is known as a high-quality rice producing area, but the quality of rice has deteriorated during the last ten years. Hotter summers are causing rice grains to opacify, rendering it unfit for packaging and selling. According to Sasaki, in 2007 the prefectural government instructed Miyagi farmers to delay planting so that the rice would ripen in autumn, when temperatures are lower. "In other words, because of these changes in our climate, we have already come to the point that we actually need to adapt our farming practices to the new environment," says Sasaki.

But warmer weather is not the only foe to healthy rice production. Deadly bugs, like shield bugs, which cause black spots on rice and thereby lessen its commercial value, are more common now than before. Sasaki says such bugs were once a rarity, and that many farmers believe their growing numbers are due to global warming.

Sasaki has also noticed increasingly erratic weather patterns and temperatures, both of which are detrimental to growing quality rice. He believes that Miyagi is already losing its suitable climate due to global warming. "It is happening. I can see only bad things from the impact of climate change. This worries me."

Asami Tetsuo comes from a long line of traditional icemakers in Chichibu, Saitama Prefecture. His family has been making ice since 1890 and he is the fifth generation to head his family company. Tetsuo uses mountain spring water to make natural ice, which he then turns into Japanese style shave ice. However, these days he can only produce ice once a year, instead of twice, as was possible in the mid 1950s. Even in December, the cold is not sustained long enough to produce adequate ice—Tetsuo thinks global warming is the main culprit behind these changes.

Tetsuo's family records of winter temperatures evidence stark differences between early days of ice making and present ones. "For many years my father kept records of the temperature at 6:00 a.m. every morning during the ice-making season, which was from mid-December through to the end of January. Glancing through these records, we see temperatures of negative 13, 15 and 12 degrees Celsius all lined up in rows."

But that is not the case today, says Tetsuo. "In the last 17 years there have only been three days or so when the temperature has gone below negative 10 degrees Celsius. These days the temperature only drops to about negative 6 degrees Celsius, even on so-called 'cold days'. Because of this, the ice doesn't become very thick."

Tetsuo is not sure what the future holds for natural icemakers and worries that this ancient tradition may soon be lost. "Shaved ice made from natural ice has been eaten in Japan since the Heian Period, over 1,000 years ago, but now there are only four natural ice-making businesses left in the whole of Japan. I don't think there will be any left in ten years if the global environment continues to change in this way."

Climate Witness

While some locals will battle with agricultural and gastronomic losses, others may find themselves homeless due to sea level rise and associated storm surges, tsunamis and coastal erosion and flooding. The homes of more than 30 million Japanese are located within 10 kilometers of the sea, 46 percent of the population lives in coastal cities and towns, and 47 percent of all industrial output is produced in Japan's coastal zones. Sea levels rising by one meter could wipe out more than 90 percent of Japan's sandy beaches. The Japanese government estimates that it will cost about US$115 billion to safeguard the country from sea level rise of this degree and that more than one trillion in assets will be at risk.

Steep financial losses could also be incurred by the advent of super typhoons and powerful coastal storms. Wind-related losses from such extreme weather could increase by as much as 70 percent—double that of the 2004 typhoon season, the priciest one in the past 100 years. Flooding is also a huge concern when it comes to abnormal weather patterns. Changes to climate and several socio-economic drivers have not only increased the probability of flood events (especially urban floods), but also the vulnerability to floods, because of increased population density and concentration of economic assets in Japan.

Threats to nature

While depleted food supplies and economic losses may be considered more primary concerns, climate change impacts to Japan's natural world is jeopardizing the country's cultural heritage and rich biodiversity. Rising temperatures are causing some, like fifth generation icemaker Asami Tetsuo from Chichibu in Saitama Prefecture, deep worry. "In the last 10 years, the temperature in winter has hardly dropped below negative 10 degrees Celsius. I feel that it is becoming very difficult to make decent ice," laments the Climate Witness.

Unfortunately, it is not just the tradition of ice making that is susceptible to climate change. Iconic symbols like the coveted cherry blossom and the Japanese crane, a national emblem for longevity and happiness, are also grappling with adaptation to temperature changes, which could have far reaching cultural impacts. The cherry tree now blooms, on average, 4.2 days earlier than it did just 50 years ago, making the changes Japan is undergoing visible to the entire nation.

Like the cherry blossom, Hokkaido's Shiretoko peninsula is another quintessential feature of Japan, and will be among the first ecosystems to feel the burn of climate change. The peninsula is the nesting site of half the world's population of endangered Steller's sea eagles, is home to the highly threatened Blakiston's fish owls, Steller's sea lions and Japan's only population of Brown Bears—all of which are already under stress from various environmental factors, including changes caused by warmer winters. As the mercury steadily rises, some species that can only exist at cool temperatures and at the highest elevations of Hokkaido's mountains will be most threatened, like the pika, a small furry mammal.

The way forward for Japan

Climate change impacts are no longer just a looming threat for countries like Japan, but increasingly an everyday reality, as evidenced by the science and the testimonies of Climate Witnesses like photographer Kenji Ito, farmer Katsuo Sasaki and icemaker Asami Tetsuo. Unless carbon dioxide emissions are drastically reduced, existing problems will only worsen. In the meantime, Japan must prepare for the worst while working towards viable climate change solutions. WWF recommends that adaptation strategies be embedded within existing national frameworks and climate change assessments be integrated into national policies. For natural systems, WWF outlines four basic tenets to rebuff climate change impacts:

1. Protect adequate and appropriate space

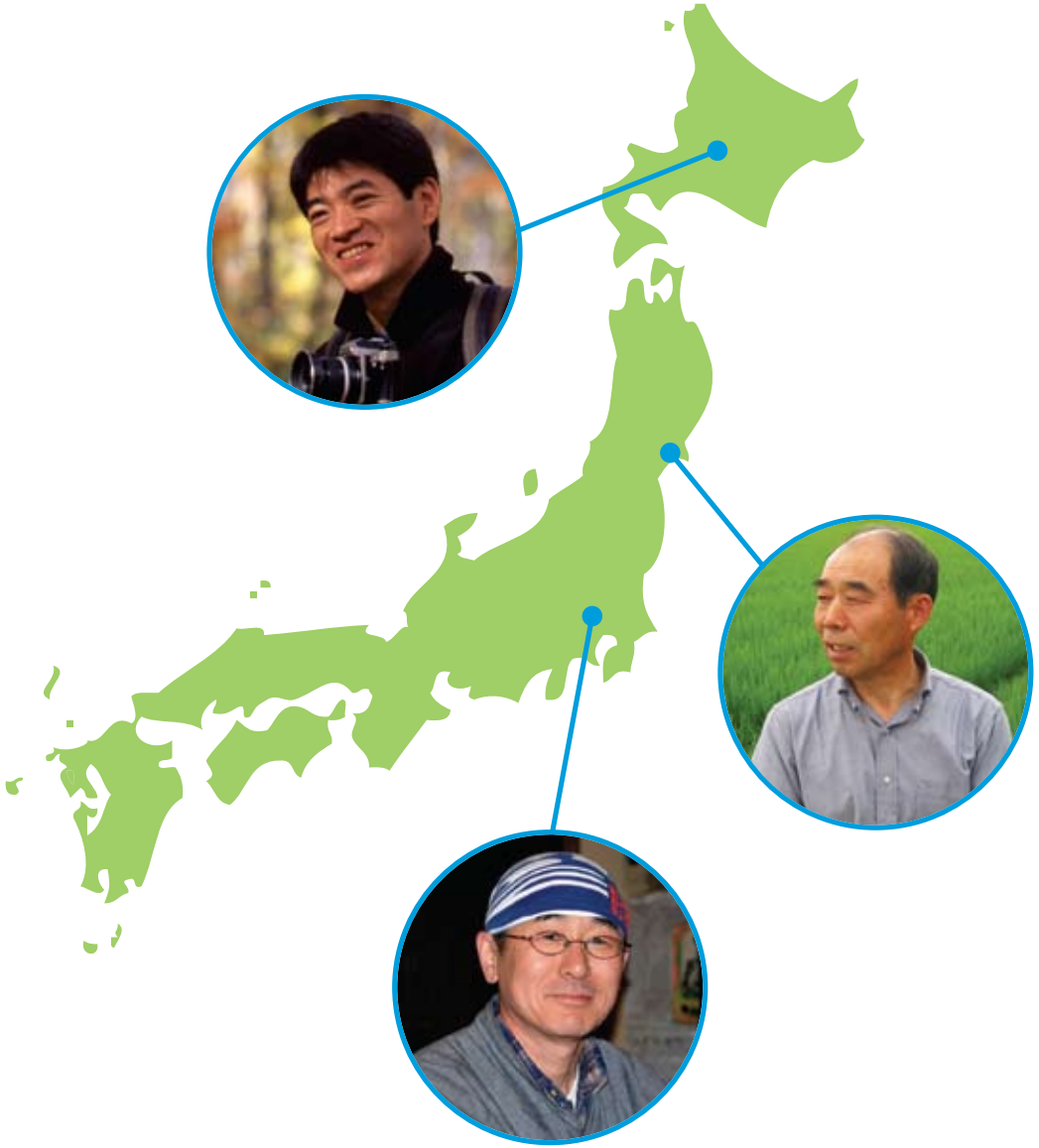
2. Limit all non-climate stresses

3. Use active adaptive management approaches and begin testing strategies

4. Reduce greenhouse gas emissions

The world can still avoid the worst impacts of climate change, but the window of opportunity for taking the action that is needed to keep global warming below the dangerous threshold of 2 degrees Celsius is closing quickly. Industrialized countries like Japan need to acknowledge their responsibility and take the lead in mitigating and adapting to climate change. The Japanese government must work towards ambitious mid and long-term emission reduction targets and implement the necessary policies and measures to achieve these targets and to quickly turn the country into a low-carbon economy. In the absence of such action, dangerous climate change stands to have grievous impacts on people and nature in Japan, from the death of age-old traditions to the elimination of entire habitats and species.

Are you a Climate Witness?



People all over the world have started to notice shifts in the climate, and many can tell a story about serious impacts on their livelihoods and businesses resulting from these shifts. Climate change is here and now, and people blame it for the major threats and difficult challenges they are facing.

Rising sea levels, deadly heatwaves, coral bleaching, severe droughts, violent storms, disappearing species and other climate impacts have become part of their lives. Some of them have become Climate Witnesses to share their stories with WWF and others. They form a growing network of people who observe change and talk about it.

Everybody can become a Climate Witness and join the network. WWF is interested to hear from you about the changes you are experiencing— and about the real danger and the heartache to communities and families that these changes are causing. Please visit WWF online and tell your story:

For English language:
www.panda.org/climatewitness

For Japanese language:
www.wwf.or.jp/climate

brochure design: Carole Guizzetti

For more information on WWF's climate work:
www.panda.org/climate

For more information on WWF's work in Japan:
www.wwf.or.jp

WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by:

- conserving the world's biological diversity

- ensuring that the use of renewable natural resources is sustainable

- promoting the reduction of pollution and wasteful consumption

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