

# GLOBAL INDEX



KUBOTA CORPORATE  
COMMUNICATION  
MAGAZINE

**2012**

## Revival

from Natural Disasters

**Kubota**

For Earth, For Life



*Prologue*

# Coexistence and Struggle with Nature — Humanity's Eternal Destiny

—From the Areas Affected by the Great East Japan Earthquake and Thailand Floods—

Since the dawn of history, hardly a single day has passed without the occurrence of some form of natural disaster, whether it is an earthquake, typhoon, flood, drought, or other calamity.

In a sense, human history chronicles our struggle against the forces of nature. In reverential awe, we human beings have maintained harmony with nature, at other times battled against it, and have time and again revived and risen stronger from the ravages of natural disasters.

In March 2011, Japan was struck by the Great East Japan Earthquake, which inflicted lasting damage unparalleled in history.

Natural disasters raged in other countries that year as well, with the Brazilian great floods in January and those in Thailand from July through October, a major earthquake afflicting Turkey in October, and a destructive typhoon striking the Philippines in December.

The United Nation's International Strategy for Disaster Reduction (ISDR) estimated that in 2011 natural disasters the world over claimed a total of 29,782 lives and a record-high economic loss of approximately 28.18 trillion yen. No matter how advanced scientific civilization becomes, natural disasters still pose a grave threat to humanity. Such catastrophes not only cause physical destruction, but also leave behind serious emotional wounds that can never be healed completely.

What must we do to overcome the danger of natural disasters?

In this issue of GLOBAL INDEX, we specifically focus on the Great East Japan Earthquake and Thailand great floods to provide firsthand reports on the ongoing rehabilitation/reconstruction efforts in the affected areas. We then conclude with our thoughts on what humanity should do to prepare for natural calamities.

# Revival from Natural Disasters

The tsunami triggered by the Great East Japan Earthquake left nothing behind but wreckage and seawater.  
(Kashima Ward, Minamisoma City, Fukushima Prefecture)

*Prologue*

# Kubota's Mission to Bring about Rehabilitation/Reconstruction

—Contributing to Human Welfare in the Areas of Food, Water, and the Environment—

The development of scientific civilization has brought economic growth along with it; however, the price to be paid for these advances has become manifest in the global warming and climate change that even now are plunging our planet into a serious crisis.

As the global population continues to grow, it is expected that the world will face acute shortages of food and water in the 21<sup>st</sup> century. There is also no small number of people who have asserted that the increase in massive natural disasters is closely linked with environmental changes as a result of rising temperatures across the globe. Upon celebrating the 120<sup>th</sup> anniversary of its foundation in 2010, Kubota set for itself the mission of “tackling global problems in the areas of food, water, and the environment.”

Kubota thus reaffirmed its aspiration to drive its business forward through services to humankind. That mission was quickly put to the test in a series of unfortunate events including the Great East Japan Earthquake, and later the floodwaters that inundated a large expanse of land in the Kingdom of Thailand, one of the key production centers for Kubota and many other Japanese companies.

“What can we do to help them to rehabilitate and reconstruct the disaster-stricken areas?”

As an answer to this question, Kubota decided to make its technologies in the areas of food, water, and the environment available to the people in the affected areas.

Following the great earthquake in Tohoku in the northeastern part of Japan's main island, Kubota set about the reconstruction of farming in that region by tapping into its rice cultivation techniques.

In Thailand, too, Kubota assisted efforts to bring production back to normal by offering its drain pumps. These devices incorporate the latest in water and environmental engineering technologies that have been honed by the company for many years.

Fully realizing the duty that it must fulfill as a member of society, Kubota was spurred on to take another step forward in assisting the rehabilitation/reconstruction process from the natural disasters.



Farmlands became like rivers due to the floodwaters. (Sai Noi, Nonthaburi Province, Thailand)

# Revival

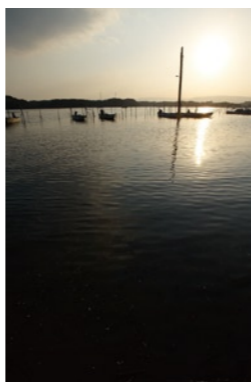
from **Natural Disasters**

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**Conditions for Survival on the Planet Earth**



Front cover: Scars from the Great East Japan Earthquake. Tsunami waves bent even utility poles like twigs. Houses were swept away without a trace left behind, and farmlands were damaged by seawater. (Kashima Ward, Minamisoma City, Fukushima Prefecture)



Back cover: Post-quake ground subsidence left a fishing port submerged. A solitary utility pole with its cables cut stands in the seawater. (Matsukawaura Fishing Port, Soma City, Fukushima Prefecture)

\*All affiliations, titles, etc. of individuals in the text are current as of March 2012.

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# Revival of Farming

— Reconstruction after the Great East Japan Earthquake —

# Let Green Once Again Spread across the Damaged Earth

## Prelude to an Innovative Farming Model



March 11, 2011 — It is with the most acute grief that this day has been engraved deep in the hearts of every person who lives in Japan, both present and future. It was the day that saw the occurrence of a natural disaster of unprecedented scale now known as the Great East Japan Earthquake, which inflicted tremendous damage on the Pacific coasts of the Tohoku and Kanto districts and consequently had a serious impact on Japanese society as a whole.

The brutal loss totaled to approximately 20,000 victims, including 15,652 deaths and 3,287 missing persons. More than 370,000 buildings were either completely (128,704) or partially (244,823)<sup>\*1</sup> destroyed, and the economic loss as a result of the disaster reached 16.9 trillion yen<sup>\*2</sup>. In addition, having temporarily lost its entire power supply in the earthquake and subsequent tsunami, the Fukushima Daiichi Nuclear Power Station became unable to cool its reactors, which led to a serious nuclear accident that resulted in the release of large amounts of radioactive substances. With the roadmap to a complete solution still obscure, the scars of this terrible

disaster have inflicted pain and cast a dark shadow over the hearts of not only the victims, but also many other people living in Japan as well. The national economy soon decelerated and the impact of its decline was felt across all industrial sectors.

Over the past year or so, not only national and local governments, but various organizations, groups, and individuals as well have been working toward rehabilitation and reconstruction of the affected areas, but it seems that there is still a long way to go<sup>\*3</sup>.

The three most heavily affected prefectures of Iwate, Miyagi, and Fukushima are some of Japan's largest producers of rice, and the three combined account for some 10% of the country's farming market in terms of production, labor, and land area. It is thus safe to say that until now they have played an essential role in Japan's national diet. Farmland either washed away or submerged after the March 11 earthquake is estimated at a total of 23,600 ha, with 15,000 ha lost in Miyagi, 6,000 ha in Fukushima, and 2,000 ha in Iwate<sup>\*4</sup>. The situation is particularly

grave in areas afflicted by the tsunami, where there is no shortage of farmers who have yet to resume their business. Levees and irrigation/drainage systems have collapsed, and the land of farmers has been affected by ground subsidence and the inflow of seawater, compounded with the delay in putting the farmers' lives back in order. Having witnessed the difficult conditions suffered by these farmers, Kubota began efforts designed to achieve early rehabilitation of the affected farmers immediately after the earthquake occurred. Among such initiatives are direct sowing of iron-coated seeds and support for desalinating rice fields flooded with seawater.

\*1 As of February 20, 2012, Emergency Disaster Countermeasures Headquarters, National Police Agency of Japan

\*2 Estimate published by the Cabinet Office, June 24, 2011

\*3 For example, of the 22.53 million tons of rubble generated in Iwate, Miyagi, and Fukushima Prefectures, final disposal has been completed for only 5%. (Ministry of the Environment, February 21, 2012)

\*4 Estimate published by the Statistics Department, Minister's Secretariat, Ministry of Agriculture, Forestry and Fisheries, March 29, 2011

# Direct Sowing of Iron-coated Seeds

Growing rice without the need to cultivate seedlings



Harvesting gold-colored rice grown from iron-coated seeds (Yamamoto Town, Watari County, Miyagi Prefecture)



Top: A fishing boat cast far up by Route 6 shows the extent of the devastating tsunami. (Kashima Ward, Minamisoma City, Fukushima Prefecture)

Bottom: A train station completely wiped out by the tsunami (JR Joban Line Shinchi Station, Shinchi Town, Soma County, Fukushima Prefecture)



Wreckage of a tractor abandoned on farmland (Kashima Ward, Minamisoma City, Fukushima Prefecture)

## Extensive Damage and Imminent Problems Making a Difference with Iron-coated Seeds

Rice farms in Tohoku begin their annual rice cultivation in March by selecting rice seeds. Careful selection of good rice seeds is indispensable for growing and harvesting quality rice. April then sees the beginning of seedling production, with many farmers growing theirs in greenhouses. It would seem that it was business as usual in 2011, as many rice farms there had begun selecting rice seeds in March, hoping for a bumper crop in autumn.

Just as this routine was about to start, the massive earthquake and tsunami pummeled the region. Farmland was either swept away or submerged by the tsunami, field infrastructures and irrigation/drainage systems such as drainage pump stations were demolished, and sludge and rubble carried by the advancing waves accumulated over a wide area of farmland. After the temblor, the ground level sank by 20 to 80 cm in various places, forcing many farms to give up rice cultivation altogether. Nonetheless, the possibility still remained that farmers might grow rice in areas in which irrigation/drainage channels and other systems had escaped the destruction.

The problem, however, was that the rice seeds and seedling cultivation equipment had been damaged by the tsunami, even if the cultivated fields and farm equipment had remained intact. Without growing seedlings, there is simply no way to go about cultivating rice.

As a solution, Kubota came up with the idea of doing away with seedling production. The process known as “direct sowing of iron-coated seeds” is an innovative rice farming technique that Kubota has attempted to spread nationwide for several years. As the name implies, the process involves sowing rice seeds coated with iron powder directly in rice paddies.

This agricultural technique is truly innovative because it can substantially reduce costs and labor by obviating the need to raise and transport seedlings, which is an essential process in transplant production. With 60% of the farming population in Japan aged 65 or over, the liquidity of farm management and farmland is accelerating, resulting in a rising proportion of farmers owning land of 5 ha or over. This in turn has brought about a polarization in the farming industry between “small-scale and aged” farmers and “large-scale” farmers<sup>\*5</sup>. The former group is being subjected to the increasingly heavy load of

cultivating and planting seedlings, while the latter is finding it almost impossible to secure labor for seedling cultivation and to provide such facilities. Regardless of the scale, raising seedlings poses a major challenge for every farmer. Hence, direct sowing of iron-coated seeds. Compared to transplant production, this technique reduces as much as roughly 77% of labor and 36% of costs<sup>\*6</sup>. Since the seeds are coated with iron powder, it also prevents them from being predated by birds. All in all, direct sowing of iron-coated seeds could make a difference in solving fundamental issues for rice farmers in Japan.

As competition among rice-growing districts in the country can only intensify, the survival of rice producers hinges on the prime imperative of achieving farming that is labor-conserving, less labor-intensive, and low-cost. In the hopes of offering a clear-cut solution to such challenges, Kubota was already proactively promoting the diffusion of this technology when the massive earthquake suddenly struck Eastern Japan.

<sup>\*5</sup> 2010 World Census of Agriculture and Forestry in Japan, Ministry of Agriculture, Forestry and Fisheries

<sup>\*6</sup> Company data, etc.

**All for the Customers**  
**“Save the Farmers with New Techniques!”**

Soma Office, Fukushima Kubota Corporation – It is through this office that Kubota distributes its products to the farming families of Soma City and Shinchi Town in Soma County on the northern Pacific coast of Fukushima Prefecture. Many of the customers there are mainly involved in rice cultivation. Because of their location along the Pacific coast, Soma City and Shinchi Town were heavily damaged by the tsunami, with 573 people left dead or missing (as of March 1, 2012). In the immediate wake of the tremor, members at the Soma Office began visiting all of the customers at their homes to determine their safety, discovering that roughly half of the existing customers had suffered harm in one way or another. Toshihiro Niizuma, a solution sales assistant manager, was one such member.

“Passing through Soma City and Shinchi Town, Route 6 divides the farmland into the ‘sea side’ and the ‘mountain side.’ Route 6 also served as a breakwater for the tsunami of March 11. As such, the tsunami dealt a devastating blow to farmland on the side closer to the sea. Many of the farmers on the sea side own large plots of land, and no small portion of their fields now requires infrastructure redevelopment, as well as recovery from salt damage. The seawater did not recede due to ground subsidence, practically turning the field into a part of the ocean, and so I had to visit my customers on foot.”

While making his rounds, Niizuma heard some farmers saying that, because their fields escaped damage from the tsunami, they still wished to crop the fields despite the loss of the seedling cultivation houses. Something clicked in Niizuma’s brain, and he became convinced that direct sowing of iron-coated seeds would be the best option for growing rice now. He lost no time in showing the customers this technique, which he had consistently promoted even before the disastrous earthquake. Eight farmers agreed to his plan,

and iron-coated seeds were set to be sown in a combined total area of 4.5 ha.

However, they were soon confronted with a dangerous aspect of the quake’s aftermath: radioactive contamination stemming from the incident at the Fukushima Daiichi Nuclear Power Station. At that time, the provisional reference value for radioactive cesium under the Food Sanitation Act was 500 becquerels (Bq)<sup>\*7\*</sup>. Agronomical surveys revealed that the radioactive cesium values of farmlands in Soma City and Shinchi Town were below this provisional reference value, but because the government continued to suspend its judgment on the matter they were not allowed to crop the field using the direct sowing method. As soon as the long-anticipated green light was given in May, a team led by Niizuma prepared rice seeds, while at the same time iron-coating and oxidizing them as fast as possible—a process that normally takes at least a week or two—until the start of planting in mid-May, about three weeks later than usual.

**Spreading the Direct Sowing Technique from Fukushima**  
**The Kubota Group’s Sincere Wish**

Understandably, many of the farmers who introduced this direct sowing technique grew concerned upon seeing paddies without any seedlings or sprouts. Once the seeds began to germinate, however, the seedlings grew smoothly and breathed new life into the fields, transforming them into a verdant landscape. When harvest time arrived in autumn, the crops produced from the fields in which the technique had been introduced were between 350 kg and 360 kg per 10a<sup>\*9</sup>, compared to 480 kg produced using the usual seedling cultivation method in the Soma area. Nevertheless, given the hard fact that the only alternative to the introduction of this technique was to have no harvest at all, it is safe to say that the direct sowing of iron-coated seeds certainly did yield some positive results. Niizuma also gained a strong sense of confidence that this new technique would work.

“After the farmers finished harvesting, many of them came back to us to say that they wanted to try it again next year. This is simply because they now have a clear recognition that the direct sowing method helps them to significantly conserve labor by way of reducing production materials and human power. Its reputation has already spread to other farmers by word of mouth and, as of February 2012, the direct sowing technique is set to be used by 11 farmers over a total area of 10 ha. I really get the feeling that our technique has achieved greater recognition and understanding in practically no time at all.”

Such being the case, what can be done to achieve even wider diffusion of the technique? The answer is “adequate management of cultivation,” according to Hisayoshi Hayashi, the head of the Soma Office. Given the fact that a harvest level similar to that using transplant production was gained in some areas, he intends to put greater emphasis on the service side of the scheme, i.e., providing more detailed suggestions on cultivation methods and techniques tailored to the conditions of each field. Also, under the recognition that the direct sowing technique is in the process of diffusing, they assist farmers in doing coating and sowing mostly for free, but will eventually need to start promoting the machines in the near future. “Our immediate target is to have more farmers introduce the technique. Through aggressive marketing, we hope to gain 30 customers with a total area of 20 ha. At the same time, we will start selling direct sowing machines so that we can see this innovative technique become truly ubiquitous.”

With his own house also having been struck by the temblor, Niizuma’s determination to achieve rehabilitation and reconstruction is particularly strong.

“Fukushima is now attracting nationwide attention for its reconstruction efforts and the nuclear incident, but I hope to turn this attention to our advantage and make ours a sales office that draws the eyes of



**GLOBAL INDEX**  
**Revival of Farming**  
**Direct Sowing of Iron-coated Seeds**

Checking the rice grown from iron-coated seeds (left: Toshihiro Niizuma, solution sales assistant manager; right: Hisayoshi Hayashi, head of Soma Office, Fukushima Kubota Corporation)

everyone in the Kubota Group across the country. We sincerely hope that the direct sowing technique will help us to deepen our communications with customers and increase their loyalty to the Kubota brand. I would be delighted if doing so could be of some help to the rehabilitation and reconstruction of Fukushima, which is my home.”

\*7 This provisional reference value will be lowered to 100 Bq from the 2012 harvest. If this stipulation is applied as is, the number of farmers who will become unable to cultivate their fields in Fukushima will not be small. Accordingly, the Ministry of Agriculture, Forestry and Fisheries on February 28, 2012, announced in its guidelines that planting in areas in which over 100 Bq but not more than 500 Bq of radioactive cesium has been detected shall be allowed, so long as certain conditions are met, such as testing of all bags of rice produced in those areas.

\*8 Becquerels indicate the quantity of radioactive materials, whereas sieverts quantitatively evaluate the biological effects of radioactive rays.

\*9 Nationwide comparison has revealed that the crops through direct sowing are between equivalent to and less by about 30 kg per 10 a than those through transplant production. (2010 by-prefecture yield survey conducted by the company)



Rice seeds coated with iron powder



Directly sown iron-coated rice seeds



Harvested rice grown from iron-coated seeds



Soma Office, Fukushima Kubota Corporation



Machinery directly sows iron-coated seeds.



Supporting farmers through provision of the latest technology and information



**Direct Sowing of Iron-coated Seeds**

**Feedback from a Farmer Using the Iron-coated Seeds  
Rehabilitating from the Earthquake to Begin Rice Cultivation Anew**

Leaving the Soma Office behind, our editorial team then visited a farmer in the city by the name of Yoshikane Ojima, who had introduced direct sowing of iron-coated seeds after the earthquake. An expert rice farmer with 29 years' experience, Ojima owns farmland that is divided by Route 6 into 12 ha on the "sea side" and 6 ha on the "mountain side." When the earthquake occurred on March 11, Ojima was applying additional fertilizers to grains in his farmland on the mountain side. Having grown uneasy due to the violent tremor, he rushed to his house standing close by his land on the sea side. In almost no time at all the ominous black tsunami, swollen and muddy, swept toward Ojima's farmland. The waters subsequently receded, but his 12 ha of land on the sea side suffered tremendous damage.

"My land subsided by 28 cm, and all of the field's infrastructure, including the irrigation

and drainage systems and everything else, was completely annihilated. The seedling cultivation equipment was also carried away by the water. Even the resumption of ordinary rice farming will involve a major civil engineering undertaking to redevelop the infrastructure. They say that the project will be funded by the government, but it has yet to be decided when the work will start. What bothers me most is the sheer lack of visibility?"

Fortunately for Ojima, his mountain-side land was spared from any damage by the tsunami. Upon being briefed on the new technique by Kubota, he took a chance with direct sowing of iron-coated seeds. When all was said and done, he harvested 350 kg of rice per 10 a, which is less than the usual 480 kg. However, he says that he found the technique appealing as it does not require the cultivation of seedlings.

On the other hand, Ojima says that he is becoming increasingly concerned about the future of rice farming management, stressing the need for farmers to become independent from government subsidies, which many

farmers must now rely on, if they wish to make their business more resilient. "I believe that farmers will be required to form a cooperative venture, possibly by establishing an agricultural corporation. Unless we aim at improving productivity through large-scale management by combining land, there is no way that we can survive the increasingly globalizing competition. Also, I might consider branching out into the "sextic" industry\*<sup>10</sup>, rather than just staying in the primary industry.

It can be said that the earthquake brought into painful focus the challenges that Japanese agriculture is being faced with. The editors also wish to point out the difficult situation of "farming of Fukushima." The extent of direct damage by the earthquake and subsequent tsunami, as well as indirect damage inflicted on farmers by the nuclear disaster, is continuing to expand on a daily basis. Sources say that rice grown in Fukushima is "piling up in warehouses" of the Japan Agricultural Cooperatives (JA), and only a limited quantity circulates in the market as a result of "damage caused by rumors" regarding the nuclear incident. Even though the authorities have acknowledged that no radioactive substances were detected, the "Made in Fukushima" label gives the market (= consumers) enough reason to reject such products. It has been some time since the term "kizuna" (or "bonds") became a buzzword in the wake of the earthquake. Given these harsh realities, it seems that each and every one of us must once again think hard about what we can do in the aftermath of this natural disaster, by putting ourselves in the shoes of those suffering from it.

\*10 Management arrangement whereby proprietors operating in a primary industry (agriculture, fisheries, etc.) branch out into food processing (secondary industry) and retailing (tertiary industry)



Kenichi Sanpei from Fukushima Kubota (left) and Kiyonobu Yoshikawa from Kubota Farm & Industrial Machinery Service (center) have a chat with Ojima after harvesting.



The "reconstruction support" arm badge worn by Kubota Group employees



Yoshikane Ojima harvests rice grown from iron-coated seeds. Soma City



Expanse of developed farmland on the mountain (western) side of the Route 6 bypass (owned by Yoshikane Ojima of Soma city, Fukushima Prefecture). Iron-coated seeds were sown on this side.

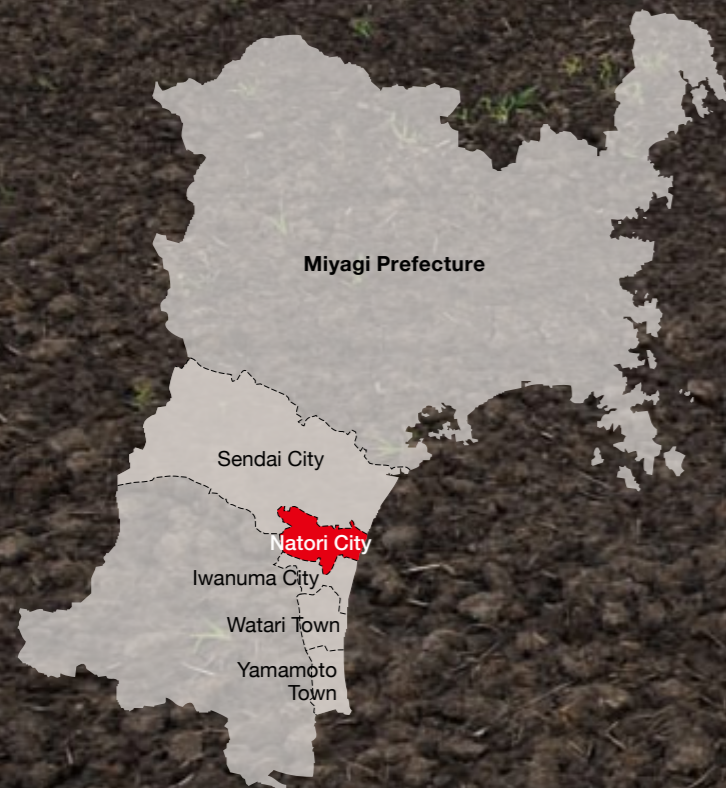


On the sea (eastern) side of the Route 6 bypass No progress has been made in infrastructure redevelopment for restoration of inundated farmland.



Yoshikane Ojima, a farmer in Soma City Already moving toward the next vision of the future





Demonstrations of desalination using rainwater took place here.  
(Koya Agri-Service field, Natori City, Miyagi Prefecture)



# Desalination by Rainwater

A desalination technique for cultivated fields in which agricultural water is not available

## Lasting Damage from Seawater Desalination Imperative to Restore Farmland

The March 11 earthquake caused extensive damage but, being the closest to the epicenter, it was Miyagi Prefecture that incurred the widest range of devastation to people and buildings, local industries, and vital utilities and other forms of social infrastructure. This is clearly evident in the fact that the number of dead and missing in that prefecture accounts for approximately half of the total, or more than 10,000. The same holds true for its farmlands, which were destroyed and inundated by the tsunami.

Of the roughly 23,600 ha of affected land, an overwhelming proportion of some 15,000 ha

belongs to Miyagi, representing up to 11% of the prefecture's total cultivated acreage. Most of the damage was inflicted by the tsunami, which destroyed the infrastructure and irrigation/drainage equipment of cultivated fields, thus having a serious impact on the farming of rice and other crops. Particularly serious was soil damage by seawater as fields became submerged, forcing some farmers to give up their cropping.

Being very vulnerable to salt, rice plants will not grow on land after it has been submerged in seawater. The residual salt must therefore be removed as soon as possible in order to restore the damaged farmland. The amount of salt can be lowered by pouring a large amount of water over the land. In other words, by "washing the soil with water" the salinity level

can be reduced; i.e., the salt can be removed.

For the early recovery of its farmland, the Miyagi Prefectural government has been working toward desalination. Under the self-set target of removing salt by the end of March 2012 from 5,250 ha of land—about 40% of the tsunami-affected farmland along the coastal areas—they set about desalination in time for crop planting in the spring of 2012. The basic process involves the "free flow of freshwater," whereby a cycle of flooding and draining is repeated, and this is believed to be the most efficient and effective way of removing salt from the ground. However, this method is limited to areas in which agricultural water is available for the job. So, what can be done if there is no access to water for desalination?



Tsunami-hit drainage pump station in Natori City, Miyagi Prefecture. It has since been repaired and is now in operation.



Dusk descends on the Yuriage district of Natori City. Many precious lives were lost in this area.



Placed in front of Koya Agri-Service, this ruined tractor is evidence of the terrible violence of the tsunami.

### Demonstrations of Salt Removal by an Agricultural Corporation in Natori City

Natori City, Miyagi Prefecture – Like many other cities on the Pacific coast, this city also suffered immense damage from the tsunami, and the number of dead and missing reached nearly 1,000. Heartrending and almost too terrible to look at is the Yuriage district, where an entire community was lost to the waves. Also, 506 ha of its rice paddies, or 41% of the total, were affected<sup>\*11</sup>. In the city of Natori, Kubota Farm & Industrial Machinery Service has its Sendai Sales Engineering Promotion Department, which is a one-stop service center for agricultural machinery. Normally, their sales engineers are busy customizing solutions for any specific farming issues that individual farmers might have, but this time they were requested to come up with quick solutions for desalination. Assistant General Manager Shunji Kiriake was put in charge of this all-too-important mission. “I mapped out the desalination plan in May. At the Miyagi Prefectural Watari Agricultural Development and Extension Center they adopted the method of making the most of forced drainage systems to repeat the cycle of flooding and tilling<sup>\*12</sup> to drain water containing salt. In Natori City, however, we were unable to follow this method, as many of the drainage channels and pumping stations for agricultural irrigation<sup>\*13</sup> had been destroyed by the

tsunami,” says Kiriake.

Such being the case, Kiriake conceived an original idea for farmland restoration based on a past case of desalination in Kumamoto<sup>\*14</sup>. With guidance and cooperation from the Miyagi Prefectural Institute of Agriculture and Horticulture, Watari Agricultural Development and Extension Center, Miyagi Prefectural Government, and Natori City Government, he gave a demonstration of the “natural penetration salt removal technique using rainwater” in a field provided by Koya Agri-Service.

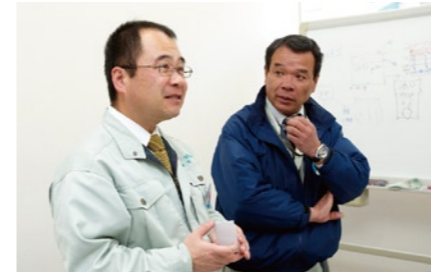
A local agricultural cooperation, Koya Agri-Service consolidates farmland within the city to conduct large-scale production of paddy rice, soybeans, grains, and the like. With 90% of its 76 ha of farmland being damaged by salt from the flooding caused by the tsunami, it was barely possible to cultivate any crops at all. Upon receiving Kubota’s offer, Koya Agri-Service “accepted it like a drowning man grasping at a straw” (CEO Toshio Sato) and agreed to make their field available for the demonstration.

Prior to this offer to conduct demonstration, in farmland where drainage channels were available they had attempted to remove salt through the free flow of freshwater in a “flooding – tilling– draining” cycle. “We had

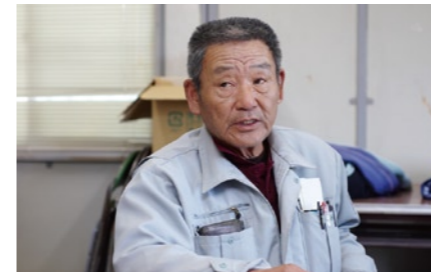
45 a of land available for cropping where draining was possible without going through drainage pump stations. We wanted to treat this farmland first so that we would be able to plant paddy rice. We believed that cropping and harvesting in 2011—the same year that the earthquake occurred—would bring a ray of hope for reconstruction.”

After a month-long desalination process that began in May, the soil’s electric conductivity (EC)<sup>\*15</sup>, a measurement of salinity, had been reduced from 6.2 to 0.4<sup>\*16</sup>. Upon confirming this value, they began planting the field with rice in June (late cultivation) to achieve a bumper crop of some 600 kg per 10 a in the autumn.

- \*11 Survey by the Miyagi Prefectural Watari Agricultural Development and Extension Center
- \*12 Originally performed to break up clumps of earth by irrigating paddy fields before rice planting. In this case, fields were tilled to remove salt.
- \*13 Drainage pumping stations for agricultural irrigation prevent farmland and agricultural facilities from being damaged by heavy rains through the use of pumps to drain rainwater into rivers and seas.
- \*14 In September 1999, Typhoon No. 18 caused a storm surge in the Yatsushiro Sea and Ariake Sea coastal areas of Kumamoto Prefecture, causing serious damage to farmland.
- \*15 As EC and salinity are closely related, salinity can be inferred from EC measurements.
- \*16 Generally speaking, the permissible EC value for farmland is between 0.3 and 0.5.



Managing Director Kazuhiko Michinobu of Kubota-Agri East (left) and Assistant General Manager Shunji Kiriake of Kubota Farm & Industrial Machinery Service (right) explain how they removed the salt.



CEO Toshio Sato of Koya Agri-Service



Deputy Engineering Director Tomoyuki Shibuya of the Miyagi Prefectural Watari Agricultural Development and Extension Center



Koya Agri-Service. Harvested cotton branches lie scattered in front of the structure.



Demonstrations of desalination using rainwater without the need for irrigation channels were suggested by Kubota. (photo taken on October 17, 2011)



Demonstrations of the natural penetration salt removal technique using rainwater achieved certain positive results and were completed in the autumn of 2011. (photo taken on October 17, 2011)



Different techniques were used for demonstrations using rainwater on fields located on both sides of this road. (photo taken on October 17, 2011)

**GLOBAL INDEX I**  
Revival of Farming  
Desalination by Rainwater



Site of demonstrations. The field was plowed for penetration salt removal by way of subsoiling.



After trenching channels with a subsoiler to enhance the water's natural penetration, various types of machinery were used for different demonstration methods.

Top left: Trenching channels using a subsoiler  
Top right: Overturning and plowing topsoil  
Bottom right: Plowing and leveeing



### Diverse Desalination Methods Sought An Effective Option – Natural Penetration Salt Removal Using Rainwater

For cultivated fields that lost their access to agricultural water due to the damage or destruction of drainage systems or for other reasons, Kubota came up with the idea of natural penetration salt removal using rainwater. Simply put, this method efficiently allows rainwater to permeate rice paddies and then drains the water out of the fields via a culvert (drainpipe) that is buried underground. Demonstrations of this technique were conducted in two stages.

In the first stage, a tractor-mounted implement called a subsoiler was used to dig trenches that intersect with the culvert at regular intervals to promote the natural penetration of rainwater. Then, to make it easier for rainwater to penetrate and drain, the topsoil was overturned and tilled. In so doing, saltwater naturally permeated the plowed layer and then reached the lower depths, thereby allowing water containing salt to be drained via the culvert.

In the second phase, sodium was removed. One of the properties of sodium is that once it has bonded with clay via absorption it will not liquate out into water. When dried, soil with high sodium content becomes hard earth, which then results in poor germination and barriers to growth. To prevent this from occurring, a soil conditioner (calcium carbonate) was used in an attempt to remove the sodium by replacing it with calcium. Tomoyuki Shibuya, the Deputy Engineering Director of the Advanced Technology Team at the Miyagi Prefectural Watari Agricultural Development and Extension Center, was present at the series of demonstrations. "The level and scale of tsunami damage vary considerably in the Watari area, which includes Natori City, and so we are investigating how we should go about revitalizing farmland from many different angles. Removing salt is of course one of the key challenges in this task. We at the Miyagi Prefectural Government will analyze data from these demonstrations so that we can make use of any findings for the establishment of more efficient and effective techniques for desalination."

As it turned out, the demonstration team satisfied its self-set numerical target (EC of 0.5), which is equivalent to what free flow of freshwater can achieve. This has now opened up the way to application of natural penetration salt removal to farmland for which supply of water for desalination is not available, dry fields without irrigation/drainage channels, or farmland that has hardened due to the use of heavy machinery for reconstruction work.

Kiriake recalls that, "Not everything went smoothly for the demonstrations. Before starting, we held extremely difficult negotiations with the administration. Through this experience, I was made to keenly realize once again the importance of overcoming any obstacles that lie before you and moving on, no matter how difficult they may be. After all, we are doing all of this for the farmers. To bring them happiness, we will remain committed to supporting them in many different ways."



After the demonstrations, the fields on both sides were filled with water. (photo taken on February 17, 2012)



With the drainage pump station restored, an abundant supply of water poured into the field via the irrigation channel. (photo taken on February 17, 2012)

**GLOBAL INDEX**  
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Desalination by Rainwater



Finally ready for crop planting (photo taken on February 17, 2012)



Raw cotton harvested by Koya Agri-Service – Soft and pure white, raw cotton symbolizes the reconstruction of farming in Tohoku.

**“Cotton Project” for the Reconstruction of Farming in Tohoku Pursuing Multifaceted Solutions for Mounting Problems**

In addition to the desalination project, Koya Agri-Service has embarked on many other rehabilitation/reconstruction projects. One such initiative is the “Tohoku Cotton Project,” which aims to cultivate “highly salt-tolerant” cotton on affected farmland where it is impossible to remove salt for one reason or another. Joining in the project along with Koya Agri-Service are other agricultural producers and 16 apparel businesses, which work together throughout the entire process from cultivation and spinning to commercialization and marketing with the goal of accelerating reconstruction from the earthquake disaster under the initiative of the farming sector. This represents what is essentially an attempt to engage in the “sixtic industry” with cotton as a vehicle.


CEO Sato of Koya Agri-Service says, “I have never cultivated cotton before, so at the start it was a major challenge for me. The project has since spread nationwide and is becoming one of the symbols of farming reconstruction in Tohoku. Cotton’s pure white flowers

restored serenity and inspired courage on the earthquake-devastated farmland. We hope that we can be of some help to the reconstruction of Tohoku’s farmland and the farming industry as a whole by continuing to grow cotton. It is true that we are victims of the disasters, but we believe that it is important to depend on our own efforts first to strive wholeheartedly toward reconstruction. We must take care of ourselves and act under our own responsibility so that we can move forward, even if it is only a single step or two.”

Sato also has a clear-cut vision of farm management. “As an increasing number of people are giving up farming after the earthquake, our land has become more consolidated. We now own about 100 ha of farmland. So far, we have tried to increase productivity by introducing three-crop rotations over two-year periods with paddy rice, grains, soybeans, and other crops. There is a natural limit to doing this with individual efforts alone. What the farming business of the future needs is to pursue collective approaches, rather than individual ones, by consolidating and expanding fields. For any farming business to survive, I believe that it is essential to reorganize private farmers into an agricultural corporation. I am convinced that this will foster

a dream that we can pass on to our successors who will carry on farming.”

This stance of Koya Agri-Service coincides for the most part with the philosophy of Ojima, the rice farmer in Soma City mentioned in the previous section. This is the attitude of trying to bring about changes on one’s own, rather than merely waiting for the central government to offer aid. At present, Japan’s farming industry finds itself beset with all sorts of problems, such as the decrease in farming families and farming population, aging farmers, lack of farming supporters, changing food demands, and ongoing globalization. It was against this backdrop that the Great East Japan Earthquake struck the country. This certainly added to the difficulties but, if we think positively, it also presents a golden opportunity to bring about major changes.

While continuing to provide multifaceted support for the reconstruction of farming from the earthquake disaster, Kubota will remain committed to proactively offering a diverse range of solutions and helping customers to apply them. This is because we believe that, by doing so, we will contribute to the development of regional farming and to the revitalization of farming throughout the country. 

# GLOBAL INDEX II

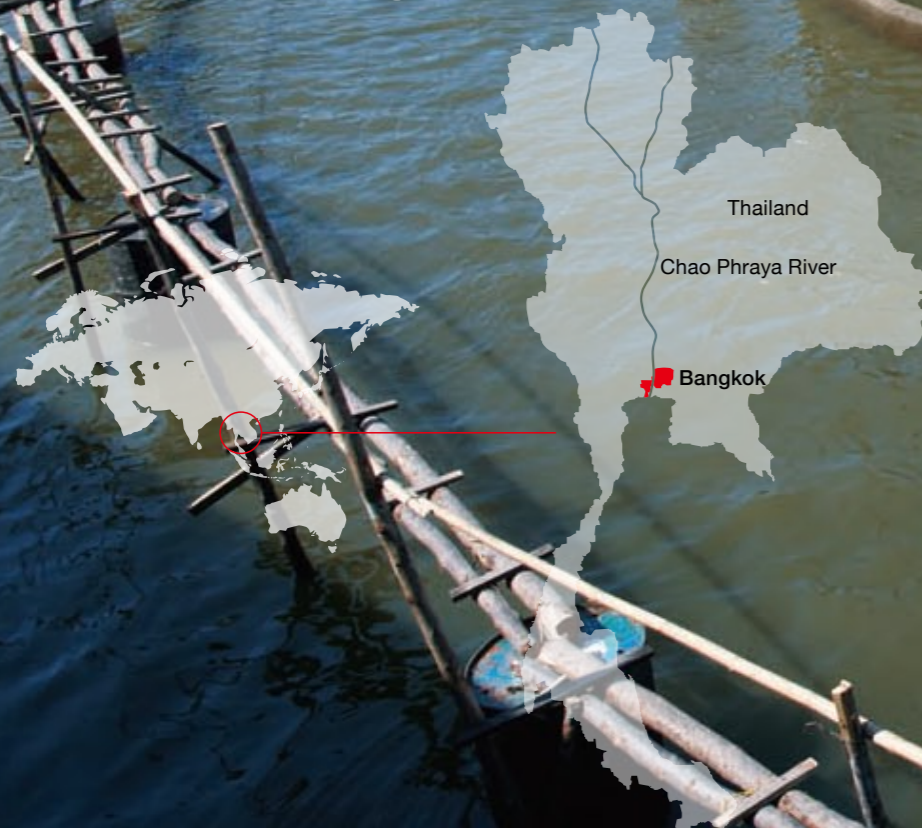
## Revival of Industry

— Reconstruction from Flood Damage in Thailand —



# Achieving Symbiosis between the Economy and the Natural Environment

Seeking an Industrial Model that Maintains Harmony between the Farming and Manufacturing Industries



A flood-damaged neighborhood (north of Don Muang Airport, near Lak Hok, Pathum Thani Province)

Located approximately 4,600 km south of Japan, the Kingdom of Thailand is often called a “land of smiles.” In the mountainous areas to the north rises the country’s highest peak of Doi Inthanon (2,565 m), while the Chao Phraya River Delta spreads across its central region to form one of the world’s largest grain belts. The local climate is tropical, with a hot season beginning in March and a rainy season lasting from June to October, which is followed by a rather cool, dry period. Extremely abundant in solar radiation, the country’s year-round temperature is about 30 degrees centigrade. Blessed both geographically and in terms of climate, Thailand boasts fertile soil that makes the country the world’s largest exporter of rice. It is safe to say that farming

of rice and other crops formed the nucleus of its national industry until the latter half of the 1980s, when the government shifted gears to result in a fully industrialized country.

By welcoming with open arms foreign companies and direct investments from Japan and Western countries, the Thai economy experienced rapid growth in the 1990s. Although the Asian currency crisis stemming from the country in 1997 caused its economy to temporarily become sluggish, a V-shaped recovery trend was achieved and high growth has been sustained ever since. Thailand’s manufacturing industry, in particular, has developed so dramatically that it may very well be said that it is now a full-

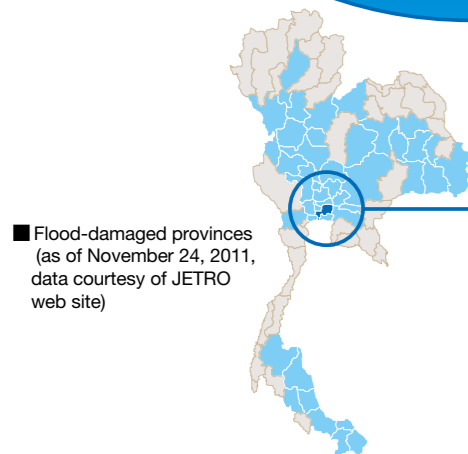
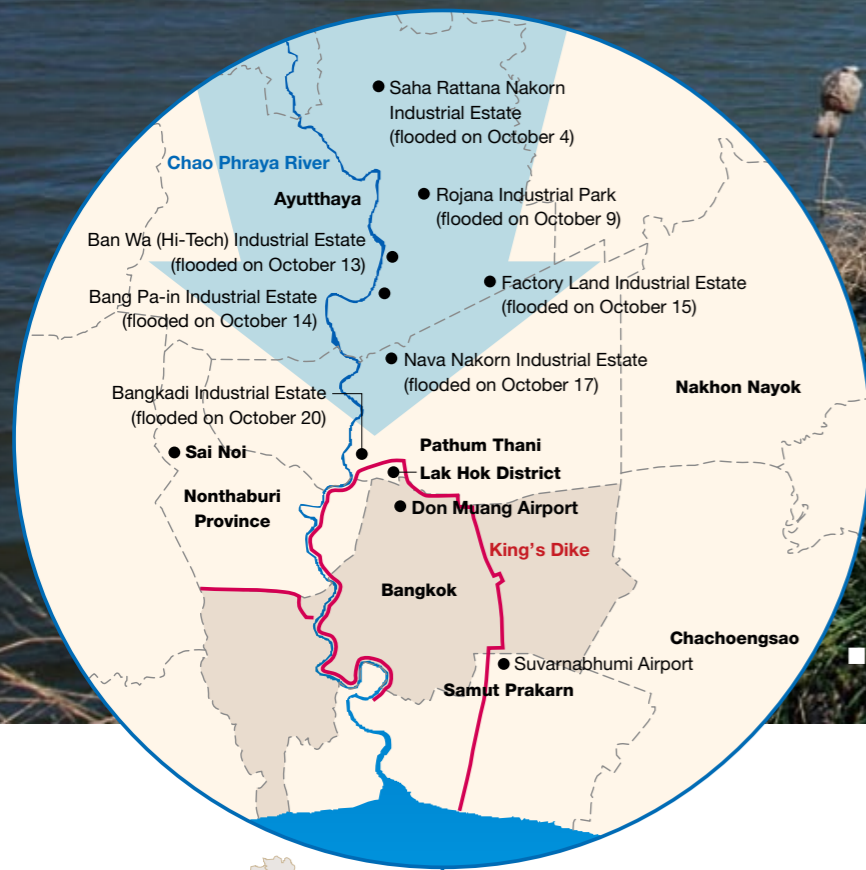
fledged industrialized nation. In fact, while farming accounts for over 40% of the working population, it contributes no more than 12% of their GDP, whereas manufacturing accounts for about 34% of Thailand’s GDP and as much as 90% of its exports, despite the fact that it constitutes only about 15% of the working population\*1. One could say that Thailand has aspects of both an agricultural country and an industrial country.

It was this beautiful nation that was struck by massive flooding about six months after the Great East Japan Earthquake occurred.

\*1 Source: Ministry of Foreign Affairs of Japan (MOFA) web site

# “Send Drain Pump Vehicles to Thailand!”

A Japan Disaster Relief Expert Team Rushed to the Site



## Underlying Causes of the Floods Switchover from Farming to Manufacturing and Distinctive Topography

The 2011 Thailand floods affected approximately 13 million people in 63 of the country's 77 provinces. Claiming 813 lives<sup>\*2</sup>, this natural disaster wreaked tremendous damage of a magnitude never before seen in the country. The direct cause behind the severe flooding was heavy rainfall from numerous typhoons triggered by La Niña, an ocean-atmosphere phenomenon in which the

sea surface temperature across the equatorial Eastern Central Pacific Ocean falls between July and October<sup>\*3</sup>. As a result, precipitation along the upper basins of the Chao Phraya River, which runs through the country, was about 50% higher than in normal years due to the kind of downpour that occurs “only once every 60 years” (Thai Royal Irrigation Department). Originating in the north of the country in July, the floods gradually moved southward, affecting virtually every province in the central lowlands by September. The floodwaters from the Chao Phraya River advanced further south to inundate the historic city of Ayutthaya (a UNESCO World Heritage site) in October and the industrial estates where many Japanese manufacturers are based. The raging waters finally reached the northern

part of Thailand's capital city of Bangkok in November.

The 2011 Thailand floods were heavily reported by the Japanese media, but in reality the country has experienced flooding on numerous occasions. Over the past 10 years, Thailand has suffered nearly 30 floods that each claimed over 100 victims, and such disasters now occur with even greater frequency than in the past. Delving a little further back into history, the country was also visited by severe floods that each took more than 400 lives in 1983 and 1995 (coincidentally, the year of the Great Hanshin-Awaji Earthquake), which spread as far as Bangkok.

Of course, the Thai Government has not sat

by idly. They have since built not only dams<sup>\*4</sup> but also the “King's Dike,” a levee that encloses Bangkok to prevent floodwaters from the north from pouring into the city, and constructed drainage canals and flood gates. However, the rainfall in 2011 was “beyond expectations.” By early October, the storage capacities at most of the country's dams had reached their limits. Knowing that it could worsen the situation in the lower reaches, the government was forced to release water to prevent the dams from collapsing, thus triggering the severe floods. When rivers overflowed in the past, the vast paddy fields served as natural reservoirs and halted the spread of damage, but some of these fields and wetlands had been transformed into industrial estates and residential districts through government-led

accelerated redevelopment projects, which resulted in a significant decline in their water-holding capacity. Also, the floods lingered over several months for various reasons, such as the country's geographical features and the characteristics of the Chao Phraya River, which flows very slowly due to its extremely low gradient<sup>\*5</sup>.

<sup>\*2</sup> As announced by the United Nations International Strategy for Disaster Reduction (ISDR)  
<sup>\*3</sup> It is believed that “La Niña” happens periodically and is not the result of abnormal weather. Due to its frequent occurrence in recent years, however, some suspect a cause-and-effect relationship with global warming.  
<sup>\*4</sup> Also intended to supply water to farmlands during dry months.  
<sup>\*5</sup> The difference in elevation between Ayutthaya in the north and Bangkok is only 2 m.



Houses and utility poles hit by flooding (Sai Noi, Nonthaburi Province)



Draining water from a marketplace (near Lak Hok, Pathum Thani Province)



Traces of water can even be found on the Reclining Buddha. (Wat Lokayasutha, Ayutthaya Province)



Water purification plant at the Nava Nakorn Industrial Estate at the time of flooding

Flooded farmlands (Sai Noi, Nonthaburi Province)

“Send Drain Pump Vehicles to Thailand!”



A Japan Disaster Relief team of drainage experts at work (Sai Noi, Nonthaburi Province)

**Bangkok Escapes Flood Damage. Water Damage at some 450 Japanese Companies in Industrial Estates**

Our editorial team arrived in Bangkok in mid-December. Contrary to the sensational headlines of some Japanese newspapers proclaiming “Bangkok Submerged,” not a trace of flooding was to be found at the center of the capital city. According to local residents, it was only the northeastern regions and the riverside areas of the Chao Phraya River flowing across the city that were inundated, and central Bangkok managed to avoid any flood damage. However, this does not mean that Bangkok escaped the floods without a scratch: in a desperate effort to defend their capital from the floodwaters, the Thai Government had built levees and sandbagged the levees to divert the incoming southbound deluge to the east and west. Because areas around Bangkok were damaged by the floodwaters that had thus been diverted, the transportation network was severed, which in turn resulted in the temporary cessation of the supply of food and other goods. In a panic, some people rushed to stockpile foods and daily necessities, and not a few took temporary shelter outside of the city, out of the concern that “Bangkok might be submerged” in the floodwaters. For the time being, the city was plunged into a state of confusion.

One thing that must be made clear first of all is that, despite extensive media reports in Japan

on how Bangkok was damaged by the floods, the most severe damage was in fact suffered by local cities, and most of the 800 victims were living outside of the capital city. Also, one sharp distinction between this instance of flooding and previous disasters was the existence of numerous industrial estates. Director Panuwat Triyangkulsri of the country’s Ministry of Industry stated that, “The Thai economy suffered a major blow due to damage in the industrial estates.” The floodwaters poured into seven industrial estates to the north of Bangkok, affecting some 450 Japanese companies—about 1/3 of those operating in Thailand. In an attempt to proffer aid in this situation, the Japanese Government decided in early November to dispatch a Japan Disaster Relief expert team to Thailand. Assembled by the Japan International Cooperation Agency (JICA), the team was charged with the mission of supporting drainage at industrial estates and elsewhere through the operation of drain pump vehicles.

**Self-sustaining, Highly Mobile “Kubota-made Pumps”  
The Pride of Professionals Representing Japan**

Ten drain pump vehicles owned by the Chubu Regional Development Bureau of Japan’s Ministry of Land, Infrastructure, Transport and Tourism (MLIT) were shipped. With a drainage capacity of 30 m<sup>3</sup> per minute, these vehicles can empty a 25-m swimming pool in approximately 10 minutes. Kubota was

involved in the development of the drain pumps mounted on the vehicles. Conventional pumps of equivalent capacity weighed no less than 800 kg, and thus cranes were needed for their installation. This made it no easy task to transport them to disaster sites and operate them there. After painstaking efforts to enhance the mobility of the pumps by reducing their weight to about 30 kg, Kubota came up with drain pumps that could be installed and removed without the use of heavy machinery. Kubota went one step beyond to combine the pump with an independent power generator to assemble a self-sustaining, highly mobile drain pump vehicle, the first of its kind in the world. Their merits having been demonstrated in the rehabilitation process following the Great East Japan Earthquake, the vehicles were to be sent overseas to assist reconstruction efforts in Thailand. Having been involved in international emergency assistance at many disaster-stricken areas outside of Japan, Kei Jinnai of JICA was assigned to the task of coordinating the work up to the commencement of drainage. “I received an order from the government to go to Thailand on November 2<sup>nd</sup>,” says Jinnai. “The drain pump vehicles left port for Thailand on the 5<sup>th</sup> and arrived there on the 18<sup>th</sup>. While they were being shipped, I was busy carrying out the preparatory work for the team, such as requesting our counterparts in Thailand to provide labor, fuel, and other necessities for draining work, selecting places for our assistance activities, and obtaining permission

for driving the vehicles on the road. In so doing, I was often impressed by the instant and accurate responses from my counterparts—so long as we made arrangements in Japan, we could leave them to take care of the rest because they have talented people and systems there that work.”

Unlike previous instances of international emergency assistance, this case saw a “hybrid” team combining members from MLIT, JICA, general contractors, and Kubota. Jinnai recalls, “The teamwork among MLIT, JICA, general contractors, and Kubota was simply fabulous. Clearly recognizing the objective of these rescue operations, they all performed their duties with the pride of true professionals. I believe that they did so in order to reciprocate the support extended by the people of Thailand for reconstruction from the Great East Japan Earthquake”<sup>\*6</sup>.

The team of experts began draining work at the Rojana Industrial Park in Ayutthaya Province on November 19. Hiroaki Kobayashi was one of the eight members from Kubota involved in the team. An experienced engineer from the Kubota Pump Engineering Department’s Construction Section, Kobayashi had been pumping water in an area of Miyagi Prefecture extending across the towns of Minamisanriku and Watari to assist in rehabilitation after the Great East Japan Earthquake from April to early November<sup>\*7</sup>. Hearing the news of



Drain pump vehicles in full operation



Team members met daily to report on progress with their work.



A banner thanking the Thai people for their support for reconstruction after the Great East Japan Earthquake

the Thai floods, he volunteered to travel to Thailand and caught a flight from earthquake-afflicted Sendai to another disaster site in Thailand.

“Before draining work began, the water at the Rojana Industrial Park was about 1.5 m deep,” remembers Kobayashi. “The entire area was covered by the floodwaters, and so we had no choice but to feel our way around. Our local workers were wonderful in responding to our expectations, which impressed me profoundly. They also proactively shared their ideas as to what they thought needed to be done next. The pumps, too, did a marvelous job of operating around the clock<sup>\*8</sup> for seven consecutive days under sweltering heat of more than 30 degrees centigrade. I believe that everyone in the team was keenly aware of the great responsibility that we were shouldering as members of the ‘All-Japan’ team.”

The team moved from the Rojana Industrial Park to carry out draining work at the Bangkadi Industrial Estate, and then shifted to neighboring residential districts, the Asian Institute of Technology, the Nava Nakorn Industrial Estate, a residential area in Plai Bang, and the Lak Hok district (Rangsit University and residential areas in its vicinity). Thanks to the mobility of the drain pump vehicles, draining work within industrial estates progressed both quickly and smoothly over the one-month period following their arrival.

-  **Panuwat Triyangkulsri**  
Director, Ministry of Industry the Kingdom of Thailand
-  **Kei Jinnai**  
Director, Training Division Secretariat of Japan Disaster Relief Team, JICA
-  **Hiroaki Kobayashi**  
Construction Section Pump Engineering Department Kubota Corporation

<sup>\*6</sup> In addition to donations, Thailand freely lent two gas turbine generators and incidental facilities to help Japan deal with the power shortage in the Tokyo metropolitan area that resulted from the nuclear incident.

<sup>\*7</sup> After the Great East Japan Earthquake, a total of 71 drain pump vehicles of the same model as those sent to Thailand were gathered from across the nation to pump out water.

<sup>\*8</sup> Excluding downtime for refueling



Large quantities of water pour in from the Chao Phraya River through flood gates. Several waterways spread across the entire city of Bangkok.

### River Engineering for “Flood Control” The Need for a Grand Design against Disasters

Sai Noi, Nonthaburi – One of Bangkok’s northwestern neighbors, Sai Noi is located about 20 km from the central area of the capital city. As the appearance of the landscape gradually changed from urban to rural, we began to see more and more areas that had been inundated by the floodwaters. While it is true that the country has numerous canals and waterways, we were greeted by the sight of entire surfaces of fields completely submerged by water. Apparently, the floodwaters had receded considerably, as the roads were sufficiently “visible” to drive on, but it did not seem that farmers would be able to resume their work any time soon. Our destination, Sai Noi, has 11 communities, and the drain pump vehicles were at work in two of them. We were told that the draining work had been proceeding according to schedule and was now in its final stage<sup>\*9</sup>. We had the privilege of speaking with Village Mayor Kanchanawat Funthong, who explained: “In our village, we have a population of about 1,000 comprising 380 families. The floodwaters began encroaching on us from September. We created ridges to defend against the waters, but

they were washed away on October 20, when the floodwaters were at their peak. The waters reached a depth of 1 m, and we had resigned ourselves to waiting for them to recede when we heard the news of a Japanese team coming to our aid with drain pump vehicles. I cannot tell you how thrilled we were, and it felt as if our dream had come true. If we had not had the drain pump vehicles, it would have taken four months for the waters to finally recede. As you can see, the roads are no longer submerged, and we are 80% to 90% back to normal. We are expecting to be able to sow seeds very soon<sup>\*10</sup>. Thanks to your help, we can all go home and resume our work.” Joining his hands together, he said, “We are truly thankful.”

We deliberately chose Nonthaburi Province and Pathum Thani Province, also a neighbor to Bangkok, because they are in a sense symbolic of the recent floods. In a desperate move to defend the capital city from the impending floodwaters that were steadily moving down from the north, the Thai Government raised the height of the King’s Dike—the linchpin of its flood control system—and placed several thousand “big bag” sandbags along roughly 6 km of railway tracks in the east, thus successfully

damming up the deluge before it reached Bangkok. As a result, the floodwaters ended up pouring into the areas around Bangkok. Located next to the capital, Nonthaburi Province saw floodwaters overrun its land. Although some point out that obsolete weather observation radar equipment prevented accurate forecasting of the heavy rainfall, the floods also revealed issues with Thailand’s irrigation and drainage systems and dam operations. The Thai Government has undertaken a variety of river improvement measures, but they have yet to take a fundamental step toward “controlling waters,” and are mostly focused on “protecting the capital city.” Going forward, it is imperative that they go back to the drawing board to map out a grand design for disaster mitigation, which would include drastic revisions to the flood control infrastructure that also encompasses the neighborhoods around Bangkok, the integrated management of rivers, and enhancement of the ability to forecast floods.

<sup>\*9</sup> Sai Noi was also an area in which draining work was finished. On December 23<sup>rd</sup>, the governor of Bangkok announced that the capital was completely flood-free.

<sup>\*10</sup> In Thailand, many rice farmers sow seeds directly instead of planting out seedlings.

## GLOBAL INDEX II

Revival of Industry  
“Send Drain Pump Vehicles to Thailand!”



“Big bags” protect railway tracks from the floodwaters. (north of Don Muang Airport)



Highways also serve as levees against floods. The current King’s Dike comprises paved roads and riverbanks. (near Lak Hok, Pathum Thani Province)



A city of water, Bangkok offers a large assortment of foods ranging from fresh meat to fish and vegetables.



Providing donations for flood victims (Taling Chan District, Bangkok)



Even after disastrous flooding, people do not forget their reverence for nature. (Sai Noi, Nonthaburi Province)



Kanchanawat Funthong, Village Mayor of Sai Noi



Once out of downtown Bangkok, a calm and peaceful rural scene spreads across the horizon.

As the city undergoes rapid urbanization, the Bangkok Mass Transit System (BTS) has been developed to ease traffic congestion.



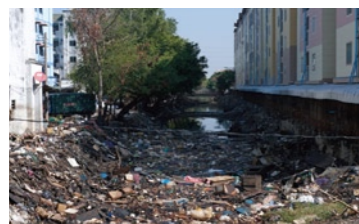


# SKC and Industrial Estates — On the Path to Recovery

“All-Kubota” Team Putting Plants Back into Full Operation



Many water trucks gather to receive pure water from the FILCERA purification system for cleaning their plants. (Nava Nakorn Industrial Estate water purification plant)



Top: After the waters receded, only scattered rubble remained.  
Bottom: All of the plant employees came out to clean.



A banner for a bank advertises loans in support of reconstruction.

(The three photos above were taken at the Nava Nakorn Industrial Estate.)

## Many Japanese Manufacturers Were Forced to Shut Down Due to Flooding of the Nava Nakorn Industrial Estate, the Home of SKC

Japanese manufacturers suffered flood damage at the Nava Nakorn Industrial Estate in Pathum Thani Province, located 45 km north-northeast of downtown Bangkok. Siam Kubota Corporation Co., Ltd. (SKC) is among the 104 Japanese-affiliated companies operating there (out of a total of 190 companies)<sup>\*11</sup>. Of the Japanese companies operating in Thailand, Kubota has the longest history in the country, dating all the way back to 1978. The company has since expanded its scope of business and in 2010 made a renewed start by consolidating its subsidiaries in that country with the aim of further accelerating its Asian business. We drove to the heavily damaged Nava Nakorn Industrial Estate to see just what had happened

to SKC, Kubota’s largest production center in Southeast Asia.

Once on the premises, the first thing that caught our attention was the desolation of the area. It seemed that the buildings remained intact, but various objects were scattered about and heaps of rubble could be seen here and there. Several days before our visit, a “Big Cleaning Day” had been announced, and employees at each plant were kept busy with fixing up and cleaning muddied equipment and fixtures. In addition to SKC, the Nava Nakorn Industrial Estate is home to Japanese companies producing plastics, aluminum casting, electronic components, semiconductors, communications equipment, electronic clocks/watches, metal processing, and the like, but most such companies had shut down. The floodwaters reached Nava Nakorn

in mid-October. Levees had been built around the estate to defend against the floods, but the deluge overflowed the levees, breaking some of them in the process, and poured into the estate. Despite strenuous efforts by each company to reinforce and sandbag the banks in order to stem the flood, the waters continued to pour in until they reached a depth of 2 m, forcing the companies to shut down their operations.

Thanks to efforts by the JICA-led Japan Disaster Relief team of experts, however, draining work had been almost completed by early December, and rehabilitation efforts had been initiated. Although some plants had resumed operations, they are nowhere near “full-scale production.”

<sup>\*11</sup> Source: Japan External Trade Organization (JETRO)

## “Connect the Line!” Supply Chain Reconnected by the Thai People’s Remarkable Resilience

After being damaged in the floods, SKC was compelled to realign its production arrangements. Production of horizontal diesel engines was temporarily transferred to an Indonesian plant and that of rotary tillers<sup>\*12</sup> was shifted to a plant at the Amata Nakorn Industrial Estate in Chonburi Province that had escaped disaster. Having served at SKC for 30 years, Manufacturing Head Quarter Deputy General Manager Chamnarong Wongvitavas spoke with us, saying, “When the waters reached this place, I urged the employees to evacuate, but many of them remained behind to prevent the waters from coming in. While I felt disheartened to see the plant being inundated, I was delighted to see that everyone tried to protect the plant. Together with the employees, we are

working hard to restore the plant for the scheduled resumption of normal operations from April 2012.”

The extent of flood damage did not end only with the shutdown of production. In Thailand alone, as many as 1.4 million farming houses were affected. While it is indeed problematic that they have been forced to temporarily suspend work while their farms are underwater, it is all the more troublesome that many of their agricultural machines have become unusable. Fully committed to user support, SKC is visiting each customer for inspection and offering some replacement parts for free. Manager Somsak Mauthorn of SKC’s Customer Service Division is taking the lead in this initiative. “We have many customers who claim that ‘Kubota is family,’” says Mauthorn. “For us, the customers are our family, and so we wish to do everything that we can for them. We offer 50% discounts on service parts, as well as labor and transportation for repair work free of charge. We are also distributing engine oil and gaskets for horizontal engines free of charge.”

Some dealers in the country were also affected by the floods, and the sales team is expected to support dealers and boost sales through promotions and the like. Manager Somboon Chintanaphol claims that this disaster reminded him of the strong ties with dealers, saying that, “Knowing the floodwaters were approaching, our employees rushed to the dealers to offer their support. One employee ran to the dealers despite being personally affected by the disaster. We also received many encouraging messages and relief goods from dealers, which was very heartwarming indeed.”

These floods had an impact not only on the Japanese economy, but on the global economy as well, as supply chains\*13 were shattered into pieces.

From a global perspective, Thailand is a hub for manufacturers, with many supporting industries in operation, such as suppliers of materials and parts. Once a downstream assembling plant ceases operations due to a disaster, materials and parts manufacturers are forced to reduce or suspend their production, and the reverse holds true as well. This negative spiral has lasted for an extended period in Thailand amid the flood damage. We asked Manager Takeshi Isonaga of SKC’s Purchasing Division about how they broke this impasse.

“Before suffering damage from the floods, our suppliers requested that we take whatever they had finished as soon as possible. So, we sent 10 trucks to receive 1,000 tires from a tire manufacturer. After our place was inundated, some suppliers were kind enough to hire licensed divers to collect 1,400 molds from the water so that we could resume production as soon as possible. For procurement of parts, we received emergency supplies from the Machinery Procurement Headquarters in Japan and temporarily switched orders to a non-affected tire supplier, thus resuming the production of tractors and combine harvesters in a short amount of time. Our mantra was “Connect the line!” I was made to realize the Thai suppliers’ indomitable spirit at the time of the great floods.”

Through concerted efforts, SKC employees struggled to protect the company from the floods, and they are still doing whatever they can to support the rehabilitation of users, dealers, and every other member of their supply chains. The driving force behind all of this is the Thai staff. In other words, the local culture of “devotion to family and business partners” is empowering the rehabilitation efforts. Taking the lead in combating the emerging floods as Managing Director at SKC, Masatoshi Kimata (now Senior Managing

Executive Officer of Kubota Corporation) took the time to speak with us.

“When the industrial estate was flooded, the employees really worked hard to protect the company, piling up sandbags all throughout the night. We also received generous support from Kubota Japan, which set up a Countermeasures Headquarters and lost no time sending pumps, a purification system using ceramic membrane filters, and other equipment, in addition to engineers. Also, Kubota Indonesia helped us with engine production. I was really made aware of the underlying strength of the Kubota Group. It seems that the entire Thai community is concerned that foreign manufacturers might relocate their plants to other countries, but for the sake of further developing farming in Thailand and our proud employees, I can assure you that SKC will remain at Nava Nakorn, and we will continue to do our best.”

Going forward, the supply chain will need to be reconfigured in a way that disperses its inherent risks by allowing procurement of parts from neighboring countries when necessary. Director Panuwat Triyangkulsri of the Ministry of Industry says, “We expect that Japan will reinforce its supply chain, which covers the whole of Southeast Asia, including Thailand. As the economy goes increasingly global, a critical situation caused by disasters or other events in one country can spread throughout the world. We will continue to support the development of more stable production arrangements by dispersing risks.”

\*12 Tractor attachments that till land using tines  
\*13 A network of suppliers



SKC Nava Nakorn Plant



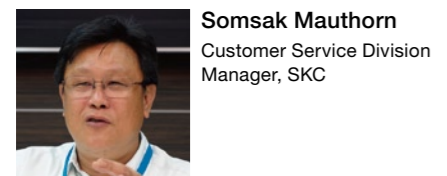
SKC Amata Nakorn Plant



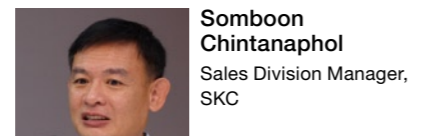
With the transfer of production from the Nava Nakorn Plant, the Amata Nakorn Plant now produces rotary tillers.



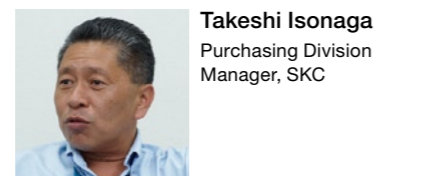
**Channarong Wongvitavas**  
Manufacturing Headquarter  
Deputy General Manager,  
SKC



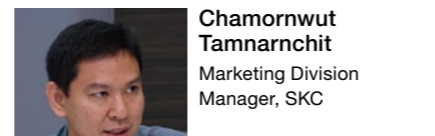
**Somsak Mauthorn**  
Customer Service Division  
Manager, SKC



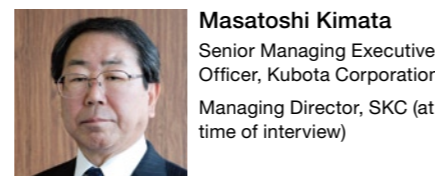
**Somboon Chintanaphol**  
Sales Division Manager,  
SKC



**Takeshi Isonaga**  
Purchasing Division  
Manager, SKC



**Chamornwut Tamnarnchit**  
Marketing Division  
Manager, SKC



**Masatoshi Kimata**  
Senior Managing Executive  
Officer, Kubota Corporation  
Managing Director, SKC (at  
time of interview)



Draining water at the Nava Nakorn Plant



Water purification unit with power generator (FILCERA)



Vice President Prajak Visuttakul of the Nava Nakorn Industrial Water System Department indicates the level reached by the floodwaters.



A sign indicates a “Big Cleaning Day.”



Water purified by FILCERA (left). The water can be further purified to drinking quality if the system is enhanced.

**GLOBAL INDEX II**  
Revival of  
Industry  
SKC and Industrial  
Estates—On the  
Path to Recovery

**SKC and Kubota Join Hands in Support of Rehabilitation Donating Pumps with Engines and Water Purification Systems**

SKC and Kubota worked proactively to support efforts for rehabilitation from flood damage. One such program involved the donation of 100 sets of pumps with diesel engines and 150 sets of pumps with gasoline engines to the Thai Government for use in draining work. This was the brainchild of Manager Chamornwut Tamnarnchit of SKC’s Marketing Division: “In addition to marketing in the field, I am also in charge of CSR\*14. I asked myself what a business could do to fulfill its social responsibility in this time of disastrous flooding, and I hit upon the idea of donating the sets of pumps. At the presentation ceremony, we were honored by the presence of Prime Minister Yingluck Shinawatra, who offered us words of gratitude. In the flooded areas to the north of Bangkok, we transported residents on our tractors, and we also offered our tractors for removing rubble on the premises of plants.”

Another donation from Kubota to the Thai Government was a set of water purification

units with power generators (brand name: FILCERA), which supply industrial water for use in cleaning plants. Having been damaged by the floods, the water purification plant feeding industrial water to companies in the Nava Nakorn Industrial Estate had become nonoperational. Informed of the situation, Japanese employee Gen Takahashi, Senior Manager of Kubota Corporation’s Strategy Planning Office, happened upon the idea, saying, “Industrial water is essential for any industrial estate. Also, after the floodwaters have receded, water will be needed for cleaning the premises and machinery. I realized that the purification plant was affected and thus unable to supply industrial water. I thought seriously about how we could provide support with our technology, and I came up with the idea of donating FILCERA water purification units.”

However, time was a pressing issue. Because FILCERA units are usually customized to customers’ individual specifications, it takes up to two months to assemble a unit; this time, they needed to do so in approximately three weeks. For flexible operation at the affected areas, the units also had to be compact and mobile. As soon as they had been completed in late November, ten FILCERA units were

shipped from Toyama Port, Japan and arrived in Thailand in early December. They were then installed at the water purification plant in the Nava Nakorn Industrial Estate to begin supply of industrial water—free of charge, of course. Prajak Visuttakul, Vice President of the estate’s Industrial Water System Department, told us about the state of things when the plant became flooded. “The peak of the inundation was October 19, when the waters were about 180 cm deep. Now, we are busy cleaning and repairing the equipment to start feeding water again. I am sure that the industrial water made available by Kubota’s FILCERA units will accelerate the reconstruction of this industrial estate, and I cannot thank you enough for your assistance. Going forward, we will bring to the attention of our government the things that we should do to control floods at industrial estates like ours, such as enclosure by high levees.”

Kubota hopes to meet water purification needs at industrial estates by spreading the word about FILCERA’s high mobility and capacity, as well as the importance of disaster preparedness.

\*14 Corporate Social Responsibility



The vast expanse of the Chao Phraya River. It often overflows to cause floods, but provides superior resources when successfully controlled.

## GLOBAL INDEX II

Revival of Industry

### SKC and Industrial Estates— On the Path to Recovery



Top: The pride of Japan—Drain pump vehicles on display at a ceremony to celebrate the completion of JICA's activities, sponsored by the Thai Ministry of Industry

Bottom: A firm handshake between Japanese Ambassador Kojima and Thai Minister of Industry Dr. Wannarat Channukul

### Shifting to an Industrial Model That Achieves Harmony between Manufacturing and Farming Prospects for Bilateral Relationships between Japan and Thailand

According to the World Bank Office in Bangkok, flood damage is estimated at 1.4 trillion baht (approximately 3.5 trillion yen), which is more than 10% of Thailand's GDP. Amid concerns over the slowdown of the Thai economy, the National Economic and Social Development Board (NESDB) of Thailand forecasts that their GDP growth may be limited to 1.5% in 2011 due to the severe floods, but that the economy would return to a recovery trajectory in 2012 to grow at a rate of 4.5% to 5.5%. In order to sustain this brisk economic growth, the task of "making the country flood-resistant" will be crucial, because the current nightmare haunting the country is a reduction in direct investments from abroad as the flood's impact still lingers.

Meanwhile, there is something else that must be considered. Conventional belief would assert that industrializing (in other words, modernizing) a country based on the model of developed countries would lead emerging countries to affluence. However, Thailand offers the potential for development through a symbiosis between manufacturing and farming, rather than a relationship of opposition. In recent years, the farming industry in Thailand has been seeking further intensification for the sake of higher land productivity and environmental conservation. What propels this initiative is the greater use of agricultural machinery as a result of industrial development. Furthermore, farmlands are not simply food-producing areas, but also serve as

social infrastructure for flood control as they retain water. If waters are controlled and put to efficient use, industrial promotion will also benefit. It is true that the country needs to address the issue of infrastructure improvement, but if Thailand begins to seek a brand new industrial model that "achieves harmony between manufacturing and farming" in addition to its current role as a "food station in Asia," it may be able to show us the way toward setting up "Asia as a food station of the world," and then toward "solutions to the world's food problems." When this becomes a reality, Kubota's business of building a bridge between farming and manufacturing should offer a fascinating perspective on the "solution to food problems."

Coincidentally, Japan and Thailand were both hit by natural disasters in the same year, taking the forms of an earthquake and flooding. Having collided with these harsh realities, the two countries were given the opportunity to reconfirm bonds of mutual assistance. At the ceremony celebrating the completion of JICA's activities that was organized by the Thai Ministry of Industry, high government officials from the two partner countries showed appreciation for the mutual support activities. On that occasion, Thai Minister of Industry Dr. Wannarat Channukul said to the members of the emergency team, "You are our true friends. Please visit us here in Thailand again as if it were your second home." Looking beyond the relationships between the two countries, as people and technology come and go freely, it is expected that Japanese companies will advance to become "glocal" ("global + local") entities and new industrial models will be created in Thailand for the whole world to share. 

# GLOBAL INDEX III

## OPINION

— From a Nature Technology Perspective —

Hideki Ishida, Ph.D.

Professor, Graduate School of Environmental Studies, Tohoku University

# “To Live with the Blessings of Nature, Let Nature Live, and Sidestep Nature.”

Hideki Ishida, Ph.D.

Professor, Graduate School of Environmental Studies, Tohoku University



## PROFILE

A doctor of engineering, Dr. Ishida was born in 1953 in Okayama Prefecture, Japan. In 1978, he joined INAX Corporation (now LIXIL Corporation), where he worked as an engineer at its Fundamental Research Laboratories and Space Design Laboratories before assuming concurrent chairmanship of the company’s Environmental Strategy Committee and Engineering Strategy Committee and later the position of Chief Technology Officer (CTO), Member of the Board. He has held his current position at Tohoku University since 2004. In an effort to bring about a paradigm shift in *monozukuri* (“manufacturing”), he frequently communicates his messages both at home and abroad. In 2004, he put forth the concept of “Nature Technology,” a new approach to *monozukuri* that attempts to make wise use of nature’s brilliance. Also a dedicated educator, Dr. Ishida is actively involved in the development of working adults who are capable of implementing environmental strategies and policies from a cross-sectional perspective, as well as children’s environmental education. Outside of the university, he holds such titles as Representative of the Earth Village Research Laboratory, Representative of the Nature Technology Research Consortium, President of Sustainable Solutions, Director of Monozukuri Living Civilization Organization, and Director of Earthwatch Japan.

## Selected recent works:

*Mysterious Tape from a Gecko’s Toes*, Alice-kan, 2011  
*Let’s Design Future Work Styles!* The Nikkan Kogyo Shimibun, Ltd., 2011  
*Learn from Nature! – Nature Technology*, Gakken Mook, 2011  
*By the Time That You Are an Adult*, The Nikkan Kogyo Shimibun, Ltd., 2010  
*Miraculous Technologies Taught by the Earth*, Shodensha Inc., 2010  
*Learning Smart Technology from Nature*, Dojin Sensho, Kagaku-Dojin Publishing Co., Inc., 2009

## Learn from Nature and “Redesign” as Technology

I formerly worked at a private enterprise for 25 years, and was in charge of supervising both their environmental and engineering strategies. While fulfilling my duties at the time, however, I always felt self-contradictory as I conducted R&D for the sake of profit at a company that was reputed to be “eco-friendly.” I then began to question myself about what manufacturing really means. What needs to be done for a resource-poor country like Japan to base its economy on industry? As I searched for an answer to these questions, I finally arrived at the conclusion that we need to acknowledge both a recycling society and the existence of human desire in order to create a sustainable society, and that the answer can be found in nature.

In the natural world, a completely sustainable society is maintained with only the smallest amount of energy. Humans need to learn about nature’s mechanisms, systems, and socialization so that, with nature serving as a base, we can start thinking about how humans should exist, and how we can discover new

forms of *monozukuri* and ways of living. The key phrase here is “to live with the blessings of nature, let nature live, and sidestep nature.” If you put this into practice, you will begin to realize new technologies and lifestyles.

Let me provide an example. “In the savanna, where temperatures can rise as high as 50 degrees centigrade in the daytime but also fall below zero in the nighttime, how is it possible that the interior of a nest of white ants is kept at a constant temperature of 30 degrees centigrade?” From this line of questioning, we discovered clay tiles that can adjust humidity and temperature. Stain-resistant kitchen sinks and exterior tiles for buildings were born from the question of why a snail’s shell does not get dirty. As in these examples, the “Nature Technology” concept attempts to learn from nature and “redesign” what is necessary for humans as technology.

## The Need for a “Backcasting” Mindset Aiming at “Affluence with Quality ‘Hoops’”

The British Industrial Revolution was successful because the country broke away from nature. A confrontational stance was

taken against nature under the assumption that everything could be expressed in numerical formulae and that nature could be completely controlled. The results of this assumption have taken form in the technology that we have today, and until now everything has been conceived by “forecasting.” That is to say, people began by analyzing the present state and then forecast what the future would be. However, everything done according to this way of thinking tends to be negative. A good example of this is the kind of efforts to force people to be “patient” by conserving energy, power, and water, which is never enjoyable.

Rather, what we need now is to switch over to a “backcasting” approach, in which we imagine how the future should be and then start thinking backward to discover what we need to do now to realize an ideal future. Designing a lifestyle based on the backcasting approach and attempting to create the technology that is necessary for it—this is what “Nature Technology” aims to achieve.

There exists a phenomenon that I like to call the “eco dilemma.” Japan’s energy conservation technology is at the cutting edge



globally, and it is truly wonderful. Over the past 15 years, the energy consumption of air conditioners has been successfully reduced by 40%, and that of refrigerators has been cut by as much as 80%. On the other hand, household power consumption has grown by 30% over that same period. This is because people think that “it is okay to buy appliances because they are eco-friendly,” and it is this mindset that has stimulated the rise in consumption. To put the matter simply, the idea of “being eco-friendly” serves as a kind of vindication for consumption. It is true that developing energy-conserving appliances is important; however, if this continues, the companies’ brand value will eventually be lowered, because the more advanced such initiatives become, the more similar technologies from other manufacturers will grow (unification of technology), inevitably leading to cost competition.

If things go on like this, Japanese companies will only grow exhausted from the harsh cost competition against their cost-efficient Asian competitors. If they are to avoid this, Japanese manufacturers need to present a vision for a new lifestyle to consumers. What they should be doing now is taking a “backcasting”

approach to envision a lifestyle without refrigerators rather than making eco-friendly refrigerators, or to imagine how one can enjoy living in an urban district without using a car.

Because of the March 11 earthquake, I personally feel that the year 2030 has arrived 20 years too soon, as it is a year for which many have warned of serious environmental changes occurring on this planet and among human society. As such, we are being pressed for quick answers to such questions as, “What is an affluent life?” and “How do we go about realizing a recycling society?” In other words, we need to accelerate the process of creating a new lifestyle by applying the “backcasting” mindset.

Gone are the days when manufacturers had only to stir up people’s desire for material gain. Now, we need to change the very nature of “desire” along with our yardstick for affluence—namely, from material affluence to spiritual affluence. This is “affluence with restraints,” or “affluence with quality hoops,” and this is something that cannot be attained from the “forecasting” mindset. All the more because of these restraints, wisdom arises,

technology is developed, and affluence is achieved.

#### **A New Lifestyle after the Quake Using a Network as a Defense**

Since about one year prior to the Tohoku earthquake, I have been conducting “interviews with 90-year olds” with my graduate students. People at that age have memories of the way of life in the prewar days when people lived in harmony with nature, and have spent the prime of their working lives during Japan’s period of rapid economic growth. And what they all have to say is that they felt greater enjoyment than they do now. As we conducted more interviews in pursuit of the nature of this “enjoyment,” we discovered several key phrases that are common to their concept of “enjoyment.” They include “feeling the rhythm of nature,” “making wise use of nature,” “roles for everyone,” “living in a happy family circle,” and the like. Upon visiting evacuation sites in the affected areas after the quake with my students, I was surprised to find that, in what must surely be some of the most difficult situations imaginable, the people at some of those

sites were full of vigor and those key phrases applied beautifully to them. By making the most of these research findings, we have begun working on the revitalization of communities in the Tohoku region.

As the recent great earthquake has forcefully reminded us, nature in Japan is harsh and, historically speaking, the country has constantly been at the mercy of nature’s fury. Living as we are in such a nation, the people of Japan should expect and be prepared to suffer from various sorts of natural disasters down the road. As a long-term precaution, it is necessary to incorporate into various systems the wisdom with which to “sidestep” nature, which is something that the Japanese people have accumulated over a great many years.

In the short run, we need to form a “mutual support network” that connects people together. The last earthquake made me keenly aware of how important it is to have a network that allows people to help and depend on others. For such a network to be created, we need to have some “hoops,” or “restraints,” that bind it together.

A quality “hoop” will inevitably bring about relationships and lifestyles that permit only an altruistic way of living. And I am sure that the network thus developed will be instrumental to the revitalization of communities, and will help us to prepare for natural disasters.

#### **Expectations for Kubota in the Post-quake Days New Ideas with “Food” as a Starting Point**

The last earthquake has inflicted a serious blow on the “food” of not only the Tohoku region, but the entire country as well; however, the fact is that its impact has so far attracted little attention. This can only be due to the fact that Japan’s primary industry accounts for a meager 1.4% of its GDP, and people view “food” only in terms of monetary value.

If Kubota claims that it is conscious of being deeply involved in the nation’s “food,” it is expected to clarify the yardstick by which the company measures “food” as well as the roles it is prepared to assume and under what circumstances it will assume them. What I would like to hear from the company is the assertion that it is not merely manufacturing and selling tools—in Kubota’s case, farming

machinery—but that it is providing or shouldering part of the “template for lifestyles of the Japanese people in which food plays a key role.”

Kubota is involved in the primary through tertiary industries. As such, is it not possible for the company to design new “community creation” from the perspective of “food” by providing links between secondary and tertiary industries with the primary industry as a base? This is a “dream for the future” that I would love to hear Kubota talk about. As a researcher, I use “lifestyle” as the minimum unit in conceiving “Nature Technology,” but so long as Kubota takes “food” as a starting point, the company can expand the framework of its conception to the “community” level.

Exploring a new template for a community, figuring out how it should exist, and developing the technology needed by such a community—If Kubota lets the people in Asia and the rest of the world know about this kind of approach, I have no doubt whatsoever that the value of the company’s corporate brand will only be enhanced. **G**

*Epilogue* —————

## Conditions for Survival on the Planet Earth

— Be Humble and Respectful toward Nature —

We humans have no choice but to be constantly faced with natural disasters.

There is nothing that we can do to prevent the occurrence of earthquakes and tsunamis, but we should spare no effort to minimize the damage that may be incurred by them.

We cannot hold back the floodwaters, but we should not let them wash away our livelihood and hopes.

The question that rises before us is: How can we confront and prepare ourselves in the face of frequent natural disasters?

What we need to do now is to itemize disaster risks and develop infrastructure that can mitigate the magnitude of damage to the utmost extent possible, by way of increasing disaster forecasting and prediction accuracy and designing and building disaster management and safety systems. At the same time, we need to enhance people's awareness of the importance of disaster management, and create disaster-proof communities.

It is important to note here that, in our present times, natural disasters are often caused by human activities, which often add to the severity of such disasters.

It is of great concern to be aware that human intervention in the natural world occurring on an unprecedented scale has inflicted serious damage to the global environment.

It can be said that natural disasters brought about by abnormal weather allegedly attributable to global warming epitomize this.

Human beings must be reminded of the humility and reverence that we once had when faced with nature.

That is the condition for humankind to survive on this planet both now and in the future.

The editorial team wishes to thank the people living in the areas affected in the Great East Japan Earthquake and Thailand Floods for their cooperation in compiling this booklet, and offer the most sincere wishes for the rehabilitation and reconstruction of such areas at the earliest possible date.

# Kubota

For Earth, For Life

