

<b>In Japan No. 3</b>	<b>Agriculture aiming for coexistence with white storks in Toyooka City, Hyogo Prefecture, Japan</b>
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## 1. Regional Profile

Geographical Location	Country and Region	Toyooka City, Hyogo Prefecture, Japan, East Asia												
	Longitude and Latitude	North Latitude 35° 32' 40", East Longitude 134° 49' 13" (Toyooka City Hall)												
	Geographical Conditions	<ul style="list-style-type: none"> <li>• Agricultural and mountainous area</li> <li>• Approximately 12 km from the nearest sea</li> <li>• Approximately 450 km from Tokyo (capital)</li> <li>• Approximately 100 km from Kobe City (prefectural capital)</li> </ul>												
Natural Environment	Topography and Altitude	<ul style="list-style-type: none"> <li>• The major part of Toyooka City is either mountainous or hilly with the lowest point of 0 m and the highest point exceeding 1,000 m.</li> <li>• While most of the city is hilly, there is a plain around the Maruyama River which runs through the center of the city.</li> </ul>												
	Climate	<ul style="list-style-type: none"> <li>• The average annual temperature is 14.0°C, and the annual precipitation is 1,988 mm.</li> <li>• According to the Koeppen climatic classification, the climate is classified as Cfa (humid subtropical climate).</li> </ul>												
	Vegetation and Soil	<ul style="list-style-type: none"> <li>• The vegetation mostly consists of red pine and konara oak secondary forests in the mountains and paddy field weed communities in the plains.</li> <li>• The soil is brown forest soil.</li> </ul>												
	Biodiversity and Ecosystem	<ul style="list-style-type: none"> <li>• A large portion of the natural environment in Toyooka City is a socio-ecological production landscape such as farmland and secondary forests formed and maintained by humans over a long period. These are places where various animals and plants live.</li> <li>• This socio-ecological production landscape is becoming abandoned due to the dwindling agriculture and forestry, population outflows and an aging of the population in recent years; there is concern that the progress of vegetation succession might deteriorate biodiversity and the quality of the ecosystem.</li> </ul>												
Social Background	Population and Changes in Population	<ul style="list-style-type: none"> <li>• The population of Toyooka City was 96,448 in 1980 and 89,208 in 2005, and is on a declining trend.</li> <li>• The aging rate (proportion of people aged 65 or older to the total population) of Toyooka City was 25.8% in 2009.</li> </ul>												
	History and Culture	<ul style="list-style-type: none"> <li>• It is estimated that humans have inhabited on the lowlands of this area since the Old Stone Age, and kitchen middens and earthenware have been unearthed that support this.</li> <li>• Toyotomi Hideyoshi built a castle in this place around 1580 and started to form a castle town, and it has been developing since as the center of the region.</li> </ul>												
	Regional Economy (Major Industries, Livelihood (including data and forecasts))	<ul style="list-style-type: none"> <li>• The key industries of Toyooka City are manufacturing and service industries. It used to be a production center for craft products made of wicker (yanagigori), and continuing this tradition this area produces the largest number of bags in Japan today.</li> <li>• The number of workers in each industry sector in 2005 is as follows. <table border="1" style="margin-left: 20px;"> <tr> <td>Primary Industry (agriculture, forestry and fishery)</td> <td>3,544</td> <td>7.9%</td> </tr> <tr> <td>Secondary Industry (mining, manufacturing and construction)</td> <td>13,485</td> <td>29.9%</td> </tr> <tr> <td>Tertiary Industry (commerce, tourism and others)</td> <td>28,088</td> <td>62.3%</td> </tr> <tr> <td>Total*</td> <td>45,117</td> <td>100.0%</td> </tr> </table> </li> </ul> <p style="font-size: small; margin-top: 5px;">*Note: As the percentages of workers in Primary Industry, Secondary Industry, and Tertiary Industry are rounded off to one decimal place, they may not add up to 100.0%.</p>		Primary Industry (agriculture, forestry and fishery)	3,544	7.9%	Secondary Industry (mining, manufacturing and construction)	13,485	29.9%	Tertiary Industry (commerce, tourism and others)	28,088	62.3%	Total*	45,117
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## 2. Use and Management of Natural Resources in the Region

### (1) Use and Management of Natural Resources in the Past and Present

#### 1) Land Use Related to the Use and Management of Natural Resources in the Past and Present

- Of the total area of Toyooka City of 697.66 km<sup>2</sup>, mountains and forests account for 261.57 km<sup>2</sup> (37.5% of total area) and farmland accounts for 58.30 km<sup>2</sup> (8.4% of total area), and the major part of the city used to be subject to the use and management of natural resources (But as described later, abandoned lots have been increasing).
- Farmland consisting primarily of paddy fields and villages are spread on the lowland along the Maruyama River.
- In the hilly and mountainous areas, rivers run between forests, and farmland and villages are located on narrow plains along the rivers or coast, displaying adjacent mosaic land use.
- As shown in the figure below, natural resources were used and managed where different land uses were related to each other in the past, however, these relationships have decreased considerably these days.

#### 2) Objectives and Details of the Current Use and Management of Natural Resources

- Forestry: Forest products such as lumber, charcoal, and compost were produced before; however, the output has decreased significantly in recent years.
- Agriculture: The agricultural output in Toyooka City is 9,200 million yen, most of which is from rice production and stockbreeding. The largest outputs by produce type in descending order are rice, chicken, vegetables, beef cattle, and dairy cattle.
- Fishery: Marine products are abundant, and fisheries are operated for food. In particular, firefly squid and a snow crab are famous nationwide.

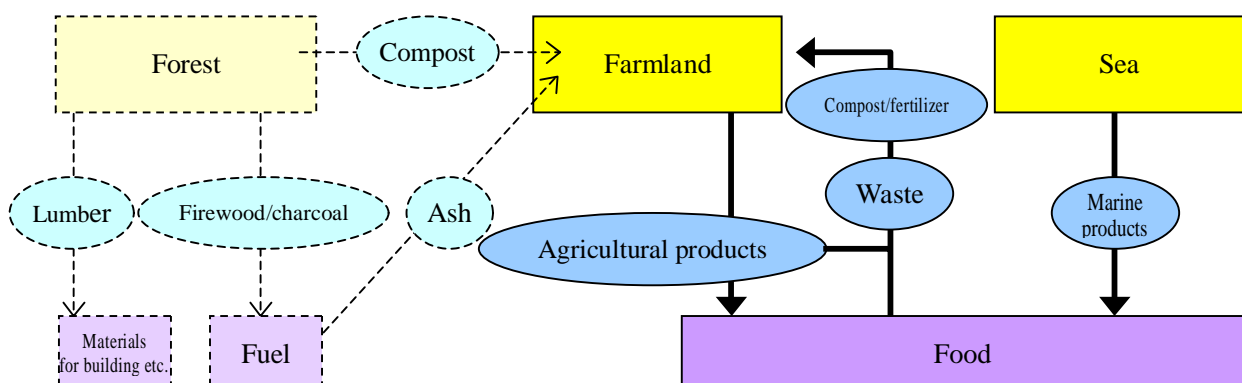


Figure: Overview of the use of natural resources

(Light-color and dotted lines: items whose use has decreased considerably )

## (2) Problems Associated with the Use and Management of Natural Resources and their Impact on Biodiversity

- Due to a decrease in demand for firewood and charcoal with the spread of fossil fuels and a decrease in demand for compost from forests with the spread of chemical fertilizer, the use of forests significantly decreased and succession has progressed in secondary forests which had been maintained for a long time, causing a deterioration in wild animal and plant habitats.
- With the spread of chemical fertilizers and pesticides in agriculture, productivity has increased, though wild animal and plant habitats have deteriorated.
- With the decline of industries including agriculture, forestry, and fishery, an outflow of population to urban areas and aging trend began, causing a decrease in people who manage and use natural resources, an expansion of abandoned farmlands, and absence of forest management.
- Furthermore, a vicious cycle has formed such that insufficient management causes an increase of bird and animal damage to farmland, leading to a further decline in agriculture, forestry, and fishery.
- Toyooka City was the last habitat in Japan for white storks, a protected species by the government. However, hunting greatly reduced numbers, and the various problems as described above accumulated, leading to the breeding population in the Japan archipelago to become extinct.

## (3) Regional Plans and Other Measures toward a Resolution of the Above Problems

- The local government body Toyooka City laid out the "Toyooka Environmental and Economic Strategy" in March 2005 (revised in 2007), pushing forward efforts that aimed to develop a region where not just the economy nor just the environment, but both the environment and the economy are in harmony. The city uses the white stork as a symbol in order to help in the resolution of above problems.

### **[Image of the region targeted by Toyooka Environmental and Economic Strategy]**

- Making efforts to create a sustainable environment
- Becoming economically independent using the environment as a resource
- Making life in Toyooka something to be proud of

### **[Promotion of Toyooka-type environmental creative agriculture]**

○The "Promotion of Toyooka-type environmental creative agriculture" is positioned as one of the five pillars for achieving its goals. This goal is the promotion of "thinking agriculture" to look through paddy fields and foster various living organisms while engaged in agriculture that is not dependent on pesticides and chemical fertilizers. Specific details are enumerated as follows.

Promoting a conversion from conventional farming methods by holding workshops and technical training sessions

Endeavoring to further improve cultivation technologies such as "Farming Methods that Foster White Storks\*\*"

Striving to expand sales by increasing the number of people who understand the meaning of the brands "Farming Methods that Foster White Storks" and "Dance of White Storks\*."

Making people believe that foods of Toyooka are safe and secure through wildlife surveys and using such activities as tourist attractions

*\*See description below for information on "Farming Methods that Foster White Storks" and "Dance of White Storks."*

### 3. Details

#### (1) Overview

Toyooka City laid out “Toyooka City Environmental and Economic Strategy” in 2005, around which various efforts are carried out aiming for a “town where the environment and economy are in harmony”.

Of these efforts, we will introduce an effort called the “Promotion of Toyooka-type Environmental Creative Agriculture” related to the sustainable use and management of socio-ecological production landscapes and the conservation of biodiversity.

Location	Toyooka City, Hyogo Prefecture (it is practiced in various parts of the city)
Involved Parties	<p><b>[Parties who manage and use the natural resources]</b> Local farmers</p> <p><b>[Technology development of farming methods]</b> Toyooka Agricultural Extension Center, JA Tajima, NPO corporation Minkan Inasaku Kenkyujo, etc.</p> <p><b>[Implementing body of agricultural promotion and measures for the preservation of biodiversity]</b> Toyooka City</p> <p><b>[Supporters]</b> Hyogo Prefecture, Hyogo Prefectural Homeland for the Oriental White Stork, NPO groups, academic research institutions, JA, Land Improvement District, etc.</p>
Background and history	<p><b>[Separation of environment and economy and the extinction of white storks, Typhoon No. 23]</b></p> <ul style="list-style-type: none"> <li>• In the Toyooka Basin, swamps spread along the gently sloping Maruyama River, and wet paddy rice growing has been carried out taking advantage of this environment. The paddy fields and wetland have been habitats for a variety of animals and plants.</li> <li>• During the high economic growth period, chemical fertilizers and pesticides came to be used extensively to boost rice productivity, and rivers were contaminated by untreated industrial wastewater, undervaluing the natural environment while pursuing economic efficiency.</li> <li>• Because of this, a number of animals and plants disappeared, above which the extinction of the white stork, which relied on paddy fields as its feeding ground, was most symbolic.</li> <li>• In 2004, Typhoon No. 23 hit Toyooka City, causing devastating damage and submerging the Toyooka Basin. Because of the damage, understanding of the importance of maintaining the harmony with natural environment rose.</li> </ul> <p><b>[Development of Environmental and Economic Strategy and the promotion of Toyooka-type Environmental Creative Agriculture]</b></p> <ul style="list-style-type: none"> <li>• Based on the background above, Toyooka City laid out the “Toyooka City Environmental and Economic Strategy” in 2005, and efforts have been developed toward a town where environment and economy are harmonized around the strategy.</li> <li>• The Environmental and Economic Strategy set the following five efforts as basic pillars in creating a town where environment and economy are in harmony.             <ol style="list-style-type: none"> <li>(1) Promotion of Toyooka-type local production for local consumption</li> <li>(2) Promotion of Toyooka-type environmental creative agriculture</li> <li>(3) Promotion of white stork tourism</li> <li>(4) Advancement of the concentration of environmental economy-type corporations</li> <li>(5) Promotion of the use of natural energy</li> </ol> </li> <li>• “(2) Promotion of Toyooka-type environmental creative agriculture” is an effort to directly work upon the sustainable use and management of secondary nature and the conservation of biodiversity.</li> </ul>

Purpose and objectives	<ul style="list-style-type: none"> <li>• The objectives of the “Toyooka-type environmental creative agriculture” are to ensure the expansion of habitat for animals and plants which live in the socio-ecological production landscape, and to strive to benefit farmers by promoting the introduction of farming methods which take advantage of an abundance of living organisms, and by striving to research and improve further.</li> <li>• A good cycle both for agriculture and environment is expected that as living organisms become abundant, agriculture becomes revitalized, and further more, the environmental creating agriculture spread further.</li> </ul>
Main contents	<p><b>[Major efforts]</b></p> <ul style="list-style-type: none"> <li>• Promotion and technological improvement of Farming Methods that Foster White Storks (environmental creative agriculture)</li> <li>• Sale of agricultural produce under the brand “Dance of White Storks”</li> </ul> <p><b>[Characteristics of the efforts]</b></p> <ul style="list-style-type: none"> <li>• The goal of the Environmental and Economic Strategy is not aiming to create an area where white storks can live but rather a “wonderful environment for human beings where white storks can also live.”</li> <li>• Environmental creative agriculture is farming methods based on the concept of taking advantage of an abundance of living organisms rather than engaging in farming while conserving living organisms (e.g. weed control by making water nets flourish or formation of a slimy layer through sludge worms).</li> <li>• Farmers and agricultural associations in various parts of Toyooka City have adopted this method, and NPOs and other organizations actively conduct wildlife surveys and study and improve environmental creative agriculture.</li> </ul>
Main achievements	<ul style="list-style-type: none"> <li>• With the introduction of environmental creative agriculture, a rich secondary natural environment that is a habitat for various animals and plants is being restored. In particular, this farming method has been practiced in paddy fields on which Agricultural Infrastructure Improvement has already been worked on and which in many cases are not suitable as habitats for living organisms, and some positive results have been attained. The coexistence of agricultural production and a natural environment are expected in the future.</li> <li>• In September 2005, a program to release white storks began on a trial basis, and the released white storks land on the paddy fields on which environmental creative agriculture is operated and use them as feeding grounds. The breeding of the released white storks was successful, and the number has increased to 36 as of December 2009, including those released after 2005. In addition, Bewick’s swans started to fly to some of the paddy fields.</li> <li>• As the area gained attention nationwide by its release of white storks, the added value of “Dance of White Storks” has come to be widely recognized.</li> </ul>



Picture: Paddy field on which “Farming Methods that Foster White Storks” have been implemented  
 (Left: Paddy field in early summer, Right: Paddy field flooded with water even after harvesting)

## (2) Details of the Use and Management of Natural Resources from the “Five Perspectives” of the Satoyama Initiative

The table below shows the primary relevance of this case to the five perspectives.

Details are given below the table for the perspectives which have high relevance (items with the “ ” mark in the table).

Five Perspectives	Relevance to this Case	
	Degree of Relevance	Summary of Relevance
1) Resource use within the carrying capacity and resilience of the environment		<ul style="list-style-type: none"> <li>• With the promotion of environmental creative agriculture, paddy rice has come to be produced within the limits of the carrying capacity and resilience of the environment and the quality of the secondary ecosystem is improving.</li> <li>• Technologies to harmonize agricultural production with biodiversity have been developed and introduced, producing positive results.</li> </ul> <p><i>* Details to follow.</i></p>
2) Cyclic use of natural resources		
2) Cyclic use of natural resources		<ul style="list-style-type: none"> <li>• One of the requirements for the “Farming Methods that Foster White Storks,” a form of environmental creative agriculture, is to utilize compost and local organic materials.</li> </ul>
3) Recognition of the value and importance of local traditions and cultures	○	<ul style="list-style-type: none"> <li>• Efforts have been implemented with the idea of reevaluating past lifestyles which were harmonious with the natural environment and adjusting them to a modern society and economy.</li> </ul>
4) Natural resource management by various participating and cooperating entities	○	<ul style="list-style-type: none"> <li>• In addition to farmers who are practitioners of agriculture, various parties such as administration, which supports and promotes the efforts, citizen groups, which implement various efforts such as wildlife surveys, academic research institutions, JA, and Land Improvement District engage in efforts in various parts of the region.</li> </ul>
5) Contributions to local socio-economics		<ul style="list-style-type: none"> <li>• The brand rice “Dance of White Storks” produced by “Farming Methods that Foster White Storks” gained national attention and its added value came to be widely recognized.</li> <li>• A number of processed products and related items have been produced, such as Japanese sake made from the brand rice, contributing to the revitalization of the local economy.</li> </ul> <p><i>* Details to follow.</i></p>

## 1) Resource use within the carrying capacity and resilience of the environment

### [Establishment of “Farming Methods that Foster White Storks”]

- Toyooka City has developed an environmental and economic strategy, a part of which is the “Promotion of Toyooka-type Environmental Creative Agriculture.” Environmental creative agriculture is a farming method to foster living organisms on farmland and use the power of those living organisms in agriculture. It aims for a reciprocal relationship between human beings and living organisms so that farmland becomes a good habitat for living organisms. And human beings engage in agricultural production borrowing the power of those living organisms.
- Toyooka Agricultural Improvement Center and JA Tajima gathered technologies of environmental creative agriculture to make “Farming Methods that Foster White Storks” in 2005. These methods are defined as “farming methods that aim for the creation of rich culture, region, and environment where delicious rice and a variety of living organisms are fostered, and white storks can live (farming methods that simultaneously foster safe rice and living organisms).”
- “Farming Methods that Foster White Storks” are supposed to meet the requirements presented in the table below.

Table: Requirements for Farming Methods that Foster White Storks

	Common items (= Required technologies or tasks)	Nonbinding items (= Recommended technologies or tasks)
Environmental consideration	<ul style="list-style-type: none"> <li>●Reduction of chemical pesticides               <ul style="list-style-type: none"> <li>- Pesticide-free type (not used during cultivation)</li> <li>- Reduced pesticide-type                   <ul style="list-style-type: none"> <li>* 75% reduced compared to area average (Koshihikari)</li> <li>* 65% reduced compared to area average (rice for sake)</li> </ul> </li> </ul> </li> <li>●When pesticide is used, use only ordinary substances and fish toxicity type A</li> <li>●Reduction of chemical fertilizers (not used during cultivation)</li> <li>●Seeds are sterilized with warm water</li> <li>●Weed control in paddy levees</li> </ul>	<ul style="list-style-type: none"> <li>●Installing fish ladders and escape routes for living organisms</li> <li>●Introduction of weed-controlling techniques (rice bran, etc.)</li> <li>●Wildlife survey</li> </ul>
Water control	<ul style="list-style-type: none"> <li>●Deep flooding control</li> <li>●Postponement of mid-season drainage</li> <li>●Early flooding</li> </ul>	<ul style="list-style-type: none"> <li>●Winter flooding</li> </ul>
Resources recycling	<ul style="list-style-type: none"> <li>●Utilization of compost and local organic materials</li> </ul>	
Other	<ul style="list-style-type: none"> <li>●Acquisition of brand certificate (Organic JAS, Hyogo Anshin Brand, Dance of White Storks, etc.)</li> </ul>	

(Source: Website of Koudani Agricultural Cooperative, Agricultural Producers' Cooperative Corporation)  
(URL : <http://www15.plala.or.jp/koudani/einoukumiai/nouhou.html>)

### [Details of technologies and tasks which constitute “Farming Methods that Foster White Storks”]

#### <Perspective of environmental consideration>

- Reduction of pesticides and chemical fertilizers are prescribed as common items.
- Installment of fish ladders and implementation of wildlife surveys are enumerated as nonbinding items. Some farmers have introduced small-sized fish ladders for paddy fields. They are inexpensive and structured so that they are easy to install. In places where Agricultural Infrastructure Improvement work has been well advanced and the fish network is decoupled, functionality as a fish habitat can be improved

significantly.

<Perspective of water control>

- Deep water control, postponement of mid-season drainage, and early flooding are enumerated as common items. Water control is a very influential factor from the perspective of farming as well as from the perspective of wildlife habitat.
- Deepwater control is to control water depth to be deep, and it enables the prevention of weeds without using herbicides. It is also thought to have a weed prevention effect as algae named water net flourish and block the sunlight going into the water.
- Mid-season drainage temporarily drains water and dries out the field during the cultivation of rice. Postponement of mid-season drainage gives time to tadpoles of frogs and toads growing in paddy fields to metamorphose and leave the water. If mid-season drainage is performed at a normal period, the larvae of frogs and toads living in the paddy field do not metamorphose in time and often die out; therefore waiting gives them time to get out of water.
- Early flooding and winter flooding covers the paddy field with water during the normally dry post-harvest period and pre-tilling period. This creates a habitat and wintering field for aquatic organisms during winter. It is also expected to become a feeding ground for white storks during winter. In addition, it is also thought to have a weed preventing effect, as winter/early flooding increases sludge worms, creating a “slimy” layer that buries weed seeds.

<Perspective of resource recycling>

- The use of compost and local organic materials is required.

<Other perspective>

- Acquiring brand certificates related to environmental creative agriculture is enumerated as a common item.

**[Research and survey on environmental creative agriculture]**

- Research on environmental creative agriculture is still in the development, and the NPO Minkan Inasaku Kenkyujo continues with research on weed control technology that does not use herbicides, which is a big task in organic farming.
- Citizen groups such as the NPO the Kounotori Citizens Institute and other academic research institutions are conducting wildlife surveys, and monitoring is performed from both a farming and environmental point of view.



Picture: Paddy fields visited by white storks during winter flooding

(Winter flooded or early flooded paddy fields are expected to provide feeding grounds for white storks and spawning grounds for frogs and toads during the off-season. White storks used to be treated as pest birds that trampled rice, but now are considered as a symbol for the recovery of nature, and have become one of the motivations for farmers to practice environmental creative farming.)





Picture: Crucian carp transferred from an environmental creative paddy field at the time of mid-season drainage

(In paddy fields where fish ladders are installed according to “Farming Methods to Foster White Storks,” a number of fish species commonly seen in paddy fields in the past such as loaches and crucian carp inhabit, making an especially good breeding ground for young fish.)



Picture: An example of weed control technology that does not use pesticides

(By spreading rice bran pellets, it is possible to control weed without using pesticides and this method also saves labor.)

## **5) Contributions to local socio-economics**

### **[Increasing added value of rice through brand certificates]**

- Rice cultivated by “Farming Methods that Foster White Storks” can be sold as high value-added products through the definition of this farming method and the brand. And it is ultimately beneficial for both living creatures and farmers. In Toyooka City, a unique certificate system called “Dance of White Storks” has been introduced.
- Agricultural products which meet the following standards are certified as “Dance of White Storks,” and can be sold and shipped as “Dance of White Storks” agricultural products with a certificate sticker attached.
- Hyogo Prefecture, where Toyooka City is located, has been implementing the certification of "Hyogo Anshin Brand Agricultural Products". And of the agricultural products which acquired this certificate, “Dance of White Storks” certificate is given to the organizations (farming cooperatives, etc.) which pay even further attention to the environment.

#### ●Objectives of the “Dance of White Storks” certification system

Its aim is to promote farming that is friendly to both human beings and nature, recognize groups that produce using farming methods that meet certain standards, increase consumer reliance by providing safer and securer agricultural products, promote the expansion of consumption, and strive for stable and long-term development of agriculture.

#### ●Certificate standards

##### “Visible security”

- Agricultural products made in Toyooka
- Producers can be identified

- Cultivation records can be checked
- Pesticide residues can be confirmed to be less than 1/10 of the national standard

“Safely produced”

- Cultivation without using or using reduced chemical pesticides and chemical fertilizers (There are Type 1 and Type 2 standards)
  - Type 1: Those produced without using chemical pesticides and chemical fertilizers during cultivation
  - Type 2: Those produced using reduced chemical pesticides and chemical fertilizers during cultivation
- Agricultural products certified with the Hyogo Anshin Brand
- The following requirements for each product type are met
  - Vegetables: Cultivated in healthy soil taking consideration of the environment by providing appropriate fertilizers according to farming field soil analysis results
  - Rice: Meeting the requirements for specially cultivated agricultural products. Also, farming methods that foster living organisms (winter flooding, machine weeding, etc.) are practiced.
  - Buckwheat: Chemical pesticides and chemical fertilizers are not used.
  - Soybeans and wheat: Meeting the requirements for specially cultivated agricultural products.

Source: Website of Toyooka City

(URL: <http://www.city.toyooka.lg.jp/www/contents/1140136975453/index.html>)

- It is structured so that by fulfilling the items of “Visible security,” the traceability and safety of the product is ensured and contributions to local production for local consumption are made.
- The items in “Safely produced” are mainly standards for ensuring safety in the process of producing agricultural products. Especially in the case of rice, the introduction of farming methods to foster living organisms is required.
- Various agricultural products such as rice, vegetables, and sake rice have been certified, and the products that acquire brand certificate have added value, and are sold as local specialties. Various branded agricultural products which use the white stork as symbol have come to gain nationwide attention with the release of white storks, and this added value has further increased, greatly contributing to the revitalization of agriculture in the region.
- In many cases environmental creative agriculture is less productive than conventional agriculture, and this tends to be a hindering factor for propagation. However, Toyooka has succeeded in promoting the involvement of farmers by marking up the value of nature conservation and safety to prices through its brand certification system.

**[Activation of environmental education and technological exchange]**

- In paddy fields where “Farming Methods to Foster White Storks” are implemented, wildlife surveys targeting school children are carried out, and the importance of environmentally creative agriculture and socio-ecological production landscapes is communicated to younger generations.
- Exchanges with outside regions have been active through agriculture-related study tours and visits by interns from other areas, and information exchange over a wide range of parties have taken place.

End