

IMPACT SHEET • SWITCH-ASIA PROJECT  
EDIBLE BAMBOO SHOOT PROJECT

# Greening the supply chain of China's agro-food processing industry



**The project supported 391 SMEs producing preserved bamboo shoots in the Zhejiang and Sichuan provinces to improve water utilisation efficiency by 40% and reduce water pollution by 70%**



## The Challenge

Currently, overuse of preservatives, water pollution and low resource efficiency are pervasive throughout China's agro-food processing industry, including packaged vegetable, fruit and meat products. In the preserved food industry, these unsustainable practices are rife, especially with bamboo shoot preservation and processing. In the Sichuan province, preservatives are often used in concentrations much higher than the maximum allowable limit regulated by China's national standards. This phenomenon not only frustrates consumers and risks market share, but also affects the development of sustainable livelihoods, environmental protection and food safety in China.

## Objective

The *Edible Bamboo Shoots* project aimed at contributing to sustainable livelihoods, environmental protection and food safety in China and beyond. The **specific objectives** included:

- to revive and increase sustainable bamboo shoot markets benefitting 300 bamboo processing SMEs economically;
- to establish a standardised green production chain for safe foods in the bamboo industries of the Zhejiang and Sichuan provinces;
- to replicate and transfer, in the third and fourth project years, successful experience gained from the bamboo food sector to 600 SMEs producing preserved vegetable, fruit and meat products, where the use of polluting preservatives is prevalent.

### TARGET GROUPS

- **Consumer groups:** raising consumer awareness of sustainable consumption and production (SCP) by engaging at least 1 million consumers to increase the consumption of eco-friendly bamboo shoots.
- **SMEs:** building the capacity of 300 bamboo shoot processing SMEs and replicating best practice to 600 SMEs processing other vegetable, fruit and meat products.
- **Bamboo farmers:** demonstrating eco-friendly bamboo farming practices to farmers, by practising organic farming and certification.
- **Governments and business associations:** engaging provincial governments and Sichuan and Zhejiang Provincial Association for Small and Medium Enterprises in policy dialogue.

## Activities / Strategy



### Creating Demand for Safe and Eco-friendly Preserved Foods

The project conducted a market survey on the quality of preserved bamboo shoots, commissioned laboratory tests and analysis of food samples, and hosted awareness-raising events to increase consumer knowledge and awareness of processed bamboo shoots. Before the project, consumers were not aware of eco-friendly bamboo shoots, whereas afterwards, consumers selected the safe and eco-friendly options, showing an increase of about 10-15%. In the case of preserved vegetable, fruit and meat products, the number of consumers choosing safe and eco-friendly products in the two target provinces showed an increase of 8-10%.



### Building the Capacity of SMEs in the Food Industry

391 SMEs applied clean technologies for primary and final product processing, thanks to project activities. The project established demonstration sites in Zhejiang and Sichuan, and developed B2B models to promote technology and knowledge transfer among SMEs. This project activity has significantly reduced water pollution, such as the total phosphorus was reduced by 90%, chemical oxygen demand and biological oxygen demand by 80%, suspended solids by 58% and ammonia nitrogen by 49%. Furthermore, efficiency in the use of water increased by 40.2% in those SMEs.



### Contributing to Policy Formulation on Food Processing

The project engaged with local policymakers and contributed to policy formulation in Sichuan and Zhejiang provinces to address the issue of the overuse of preservatives and their contribution to pollution. Training sessions for government representatives and industrial associations to monitor and evaluate sustainable food production were conducted. The project submitted policy recommendations on provincial bamboo shoot processing standards and supported the two provincial governments to adopt the new standards.



Farmers selling bamboo shoots at road side

# Scaling-up Strategy



## Transferring Knowledge to Other Sectors

The project replicated best practice from the bamboo shoot sector to another 600 SMEs producing preserved vegetables, fruits and meats. This took place during the last two years of the project implementation. Manuals on green practice were developed based on the successful experiences of bamboo shoot SMEs, covering the complete range of activities from primary processing to the final product in China's food value chain. The manuals have helped the vegetable, fruit and meat processing industries also to apply the green approach and clean technology.



## Developing Standards and Policies

Two standards on eco-friendly bamboo shoot farming and SME primary processing technology were developed in collaboration with the governments of Zhejiang and Sichuan. Once the provincial governments issue the policies on standard implementation, the standards will continue to be part of governmental monitoring systems of SME compliance to ensure safe, eco-friendly food production.



Moso bamboo shoots



Fresh bamboo shoots to be processed



*Food safety was a critically sensitive issue in China. The project therefore addressed the overuse of preservatives and pollution by introducing technology improvements and contribution to policy formulation and governance in Sichuan. The project developed recommendations on provincial bamboo shoot processing standards, and supports the government in adopting the new standards. The project also sought to build the capacity of government representatives and industrial associations to monitor and evaluate sustainable food production. This combined approach, targeting both producers and consumers, meant that the consumption of safe and eco-friendly preserved foods by green SMEs in China was revived, which will also benefit consumers outside China.*

*Dr. Lou Yiping  
Programme Director  
International Network for Bamboo  
and Rattan (INBAR)*



## Strengthening the Capacity of Policymakers to Implement Food Standards

Provincial governments were involved throughout the project implementation. The project conducted training sessions and study tours for the government agencies responsible for environmental standards of food products. This increased the government's ability to train SMEs as well as monitor and enforce existing standards to ensure the long-term sustainability of the project.



## Building an Information and Service Platform

The project established a platform in Lin'an City, Zhejiang province, to provide global bamboo SMEs with industry information and guidelines as well as training materials. The platform supports a sustainable, pro-poor supply chain by establishing close links among farmers, households and semi-processing and preservation small enterprises with medium to large companies that produce final bamboo shoot products (canned shoots, salty shoots, dried shoots) as well as links with businesses, scientists and policymakers.

## Results



### Increased Demand for Eco-friendly Foods

As consumers became increasingly aware of environmental and food safety issues, the consumption and export of processed bamboo shoots have seen a decline of 2-5% annually over the past 10 years. By raising consumers' awareness of the eco-friendly foods, general consumption of bamboo shoots has increased by 9.52%. The consumption of bamboo shoots produced from the demonstration SMEs has increased by 30% on average; the consumption of preserved vegetables, fruits and meats by 8% on average. All these products were produced in line with the green production standards.



### Reduced Pollution and Waste

Prior to the project intervention, most bamboo shoot SMEs in Zhejiang and Sichuan provinces consumed too much water, polluted and generated excess waste. Particularly in Sichuan, harmful chemicals (mainly salt and sodium pyrosulphite) led to severe pollution. The project worked with 391 SMEs, and as a result, their overall water utilisation efficiency has been improved by around 40% from 0.138 tonnes of shoots produced per tonne of water in 2011 to 0.194 tonnes of shoots produced per tonne of water in 2016. The water recycling rate has been increased to 71.7% after the project intervention, while only one SME had recycled water before the project, with a 16% recycling rate. The quality of sewage treatment of 15 demonstration SMEs now meets the requirements of the local environmental protection standards. The project has significantly reduced water pollution, such as total phosphorus was reduced by 90%, chemical oxygen demand and biological oxygen demand reduced by 80%, suspended solids reduced by 58% and ammonia nitrogen reduced by 49%. More than 95% of the waste generated from processing activities is now being reused or recycled to produce fodder for livestock breeding (such as goats, cattle and pigs) or fertilizer, thanks to the project. A further project result is that the use of preservatives in Sichuan now meets the required safety standards.



### Established Demonstration Clusters in Two Provinces

The project established a demonstration cluster in Zhejiang with 12 SMEs, showcasing water recycling, and one in Sichuan with three SMEs, showcasing reduced use of salt and sodium pyrosulphite. These demonstration SMEs act as training incubators for the adoption of sustainable production technologies, which have now been replicated to 391 SMEs across the two provinces.



*Bamboo shoot preservation at a factory*



*Canned bamboo shoot ready to enter the markets*



### Developed New Policies and Standards for Food and Pollution Control








In collaboration with business associations, the project developed recommendations on provincial bamboo shoot processing standards for processed foods and for pollution control. In cooperation with the provincial governments, the project developed policy recommendations for the adoption and implementation of the new standards. In Sichuan province alone, two standards have been developed for bamboo shoot production on the appropriate use of preservatives for fresh water bamboo shoots and preserved bamboo shoots. At the time of writing, both standards were to be adopted as environmental friendly policies, ensuring more consistent product quality and safety.



### Promoted SCP through Showcases

Lessons learnt and business models from the bamboo shoot sector were showcased and replicated to other food SMEs. Four manuals on green production have been developed: Sichuan Green Production Guideline for pickled vegetables, Sichuan Green Production Guideline for canned orange, Sichuan Green Production Guideline for preserved meat products, and Zhejiang Green Production Guideline for Jinhua Ham, which have been disseminated during information exchange events and training activities to 600 food processing SMEs in the two provinces. This promotion has helped to further raise awareness as well as reducing health threats to consumers and harm to the environment.

# Impact in Numbers

<p><b>Economic Impact</b></p> 	<ul style="list-style-type: none"> <li>Bamboo shoot consumption has increased by 9.52%, benefitting SMEs economically. On average, the consumption of eco-friendly bamboo shoots produced by the 15 demonstration SMEs increased by 30% and of preserved vegetables, fruits and meats by 8%.</li> <li>The experience and business models from the bamboo shoot sector were showcased and replicated to other food SMEs, through four manuals on green production, which have been disseminated during events and training activities to 600 food processing SMEs in the two provinces, greening the supply chain.</li> <li>Reused or recycled waste generated from the food processing to produce fodder for livestock breeding (such as goats, cattle and pigs) and fertilizer.</li> </ul>	<p><b>Target Group Engagement</b></p> 	<ul style="list-style-type: none"> <li>The project engaged with around 1 000 SMEs through workshops and training, where 15 SMEs were integrated into demonstration clusters, showcasing water recycling and a reduction in the use of salt and sodium pyrosulphite.</li> <li>The project estimated of having reached 330 000 people (consumers, retailers, food producers, business associations, policymakers) through 35 outreach activities (exhibitions, events, trade fairs) as well as technical training and study tours.</li> <li>There was an increased awareness of consumers about the adverse environmental and health effects of preservatives and unsustainable production practices. This contributed to increased consumption of eco-friendly bamboo shoots and preserved vegetables, fruits and meats which were produced in line with the green production standards.</li> </ul>
<p><b>Environmental Impact</b></p> 	<ul style="list-style-type: none"> <li>Introduced water recycling, with an increase from 16% to 71.7%, and sewage treatment among the processing SMEs to promote sustainable production.</li> <li>Achieved a reduction of 40.2% in water consumption from 7 246 tonnes water to produce one tonne of bamboo shoots to 5 153 tonnes water.</li> <li>Achieved a 61.7% reduction of waste water discharge from 74% to 28.3%.</li> <li>Achieved a reduction in solid waste, as now 95% of waste generated from the food processing was reused or recycled to produce fodder for livestock and fertilizer.</li> <li>Improved the environment by reducing water pollution: the total phosphorus was reduced by 90%, chemical oxygen demand and biological oxygen demand by 80%, suspended solids by 58% and ammonia nitrogen by 49%.</li> </ul>	<p><b>Policy Development</b></p> 	<ul style="list-style-type: none"> <li>The project submitted six policy recommendations. Two standards developed for bamboo shoot farming and primary processing technology in Sichuan and Zhejiang provinces. In Sichuan alone two sets of standards have been developed on the proper use of preservatives for fresh water bamboo shoots and for preserved bamboo shoots. The sets of standards will be adopted as environmental friendly policy once approved by the Sichuan government. This will ensure more consistent product quality and safety in the province.</li> <li>Four manuals on green production were developed for preserved meat, vegetables and fruits for sustainable production with an emphasis on resource efficiency and food safety.</li> <li>Sichuan and Zhejiang provincial governments were involved throughout the project implementation, with training sessions and study tours for those responsible for environmental standards of food products, increasing the government's ability to train SMEs.</li> </ul>
<p><b>Social Impacts</b></p> 	<ul style="list-style-type: none"> <li>Thanks to the project, the use of preservatives in Sichuan now meets the required safety standards.</li> <li>There is increased awareness of consumers about the adverse environmental and health effects of preservatives and unsustainable production practices.</li> </ul>	<p><b>Europe-Asia Cooperation</b></p> 	<ul style="list-style-type: none"> <li>Promoted knowledge exchange on best practice in the fields of bamboo and food safety through leveraging INBAR's global network.</li> <li>The project established a platform in Lin'an City, Zhejiang province, to provide global bamboo SMEs with industry information, guidelines and training materials. The platform supports a sustainable, pro-poor supply chain.</li> </ul>
<p><b>Climate Benefits</b></p> 	<ul style="list-style-type: none"> <li>By the recycling and reusing of more than 95% waste generated from the processing, greenhouse gases emitted from biomass waste, such as methane, have been significantly reduced.</li> </ul>		



**Legend**

- Eligible countries for the SWITCH-Asia Programme
- Non-eligible Asian countries for the SWITCH-Asia Programme

**Project implementation area**

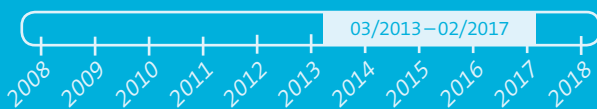
- City
- Region
- Country

*The boundaries shown on this map do not imply on the part of the European Union any judgment on the legal status of any territory or the endorsement or acceptance of such boundaries.*

**OBJECTIVES**

The project aimed at contributing to sustainable livelihoods, environmental protection and food safety in China and across the globe. Specifically, it aimed at reviving the industry and increasing economic benefits of 300 bamboo shoot SMEs through the adoption of eco-friendly food processing technologies, and to replicate the successful experience to another 600 food-processing SMEs.

**DURATION**



**PROJECT TOTAL BUDGET**

EUR 2 482 103 (EU contribution: 80%)

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**PARTNER**



Zhejiang A and F University (ZAFU), China



International Federation of Organic Agriculture Movements (IFOAM), Germany



International Network for Bamboo and Rattan (INBAR), China



Association for the Bamboo Industry of Anji, Zhejiang (ZJBAMBOO), China

Zhejiang Provincial Association for Small and Medium Enterprises (ZJSME)

Sichuan Provincial Association for Small and Medium Enterprises (SCSME)

Association for the Bamboo Industry of Yibin, Sichuan (SCBAMBOO)