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# Biogas from livestock waste to reduce water pollution in Lake Tai, China

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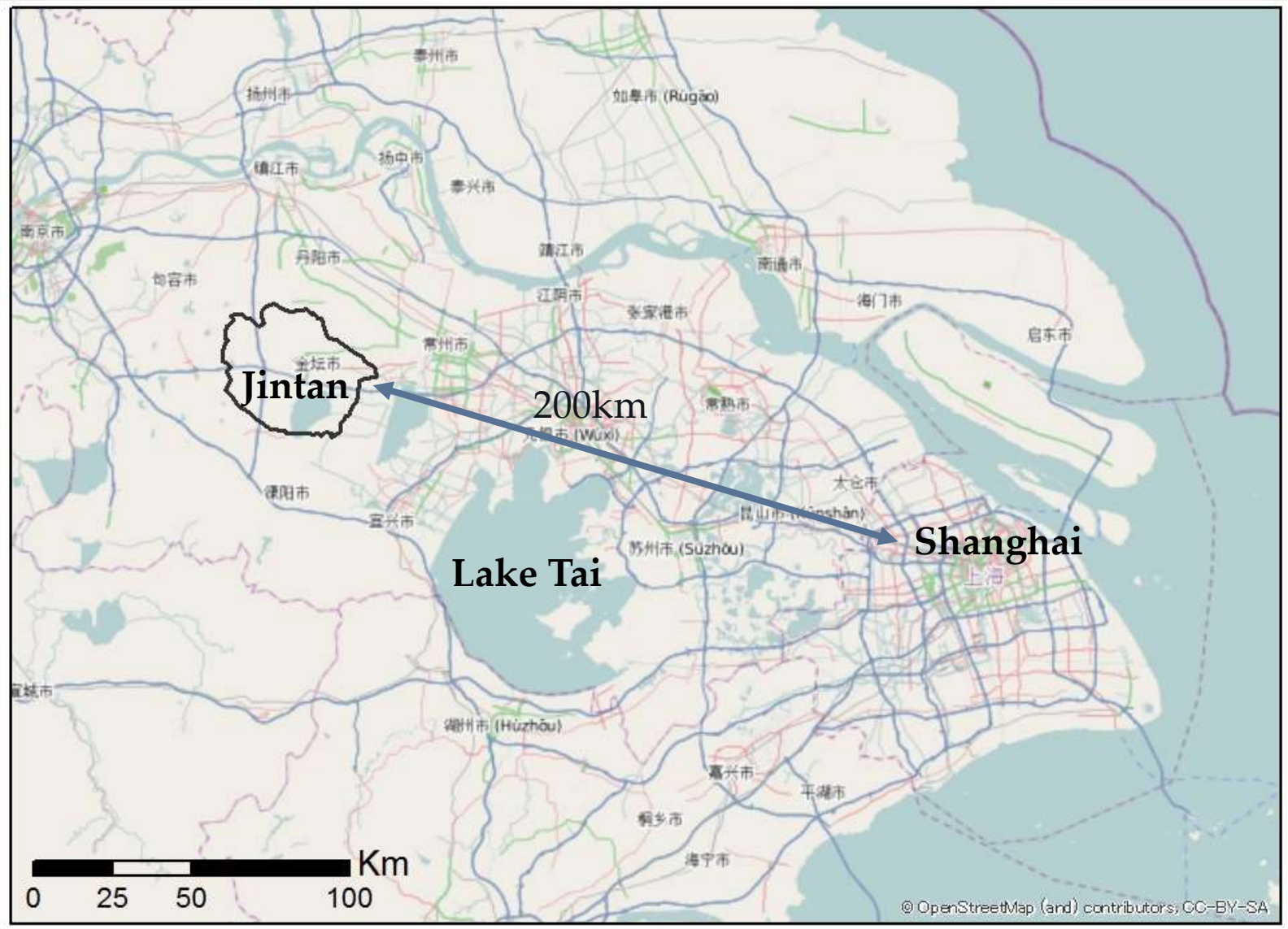
# 1. Introduction



# 1. Introduction

- Water pollution in Lake Tai

October 1992

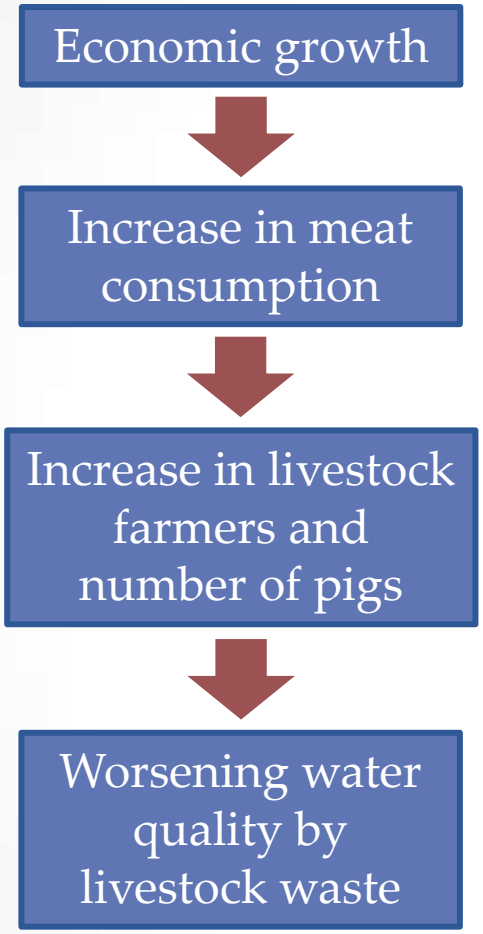
October 2005

- Main causes of water pollution

Nitrogen source (Mizuochi, 2009)

- Urban waste water 19%
- Industrial waste water 29%
- Livestock waste 52%

# 1. Introduction




Number of livestock increased more than three folds from 2002 to 2011
(Main livestock is pig)

Roughly
45% of COD
54% of T-N
68% of T-P
are coming from agricultural sector
Mizuochi (2012)

# 1. Introduction

Pollution control by the government

Direct release to watershed is strictly prohibited by authorities

Installation of biogas plants

All the piggeries are required to install biogas plants

- Main product: Electric power
- By-product: Digestive juice

Nonetheless, farmers release digestive juice to watershed

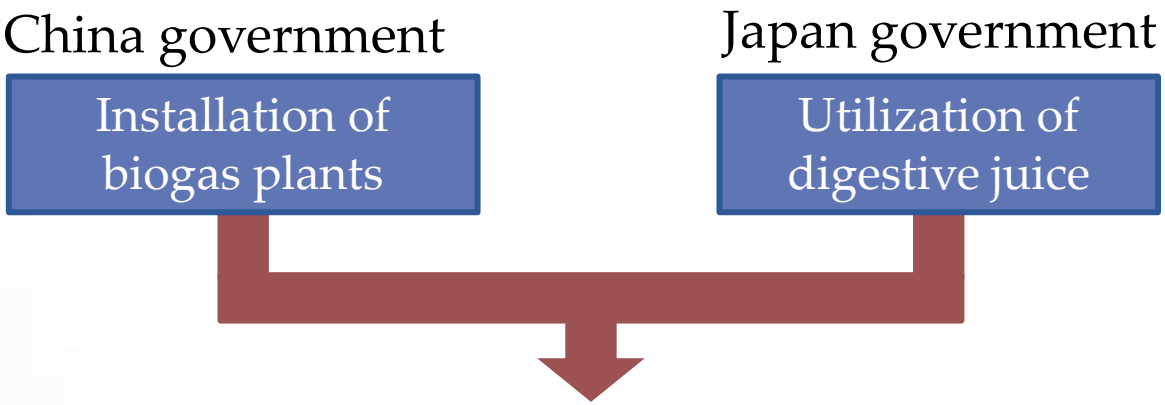
Digestive juice should be utilized somewhere to solve water pollution problems

A project to utilize digestive juice as organic fertilizer in nearby arable farms was launched with Japan's support

# 1. Introduction

# 2. Answers to selected questions

- Status
  - This case is a combination of two different policy and project




  - China governments is now promoting to install biogas plants in piggeries, however, the JICA project to utilize digestive juice has launched in 2010 and completed in 2012

# 2. Answers to selected questions

- Positive impacts for water quality
  - A previous research showed high burdens of COD, T-N, and T-P mainly come from agricultural sector, the shares of agriculture in total amount are 45%, 54%, and 68% respectively
  - And main source of pollutants from agriculture is livestock breeding. Therefore, reduction of water pollutants from agriculture particularly from livestock breeding is necessary and important to improve water quality in Lake Tai

# 2. Answers to selected questions

- Positive impacts for water availability
  - The extraction of water for domestic use from Lake Tai was suspended due to worsening quality in 2007. If water pollution is improved, the extraction will be resumed and much more water will be availabile

# 2. Answers to selected questions

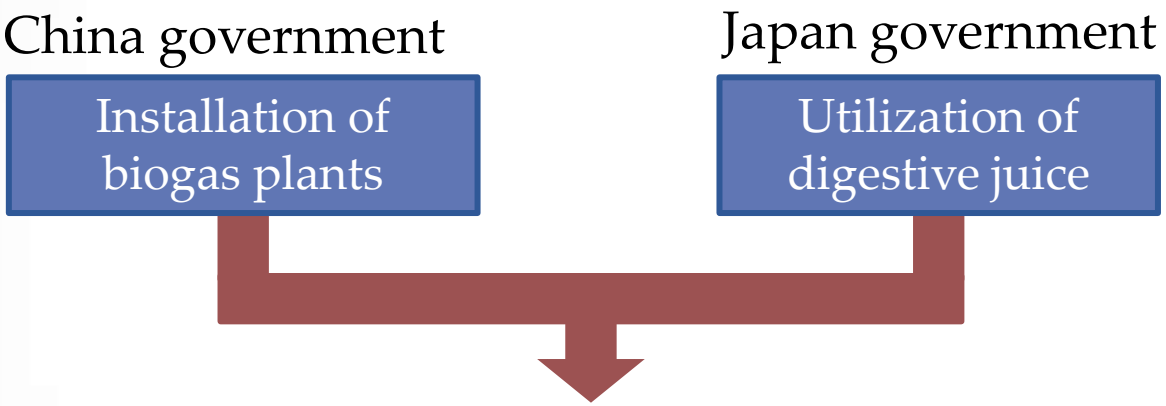
- Main drivers for implementing the project
  - Installation of biogas plants
    - Serious water pollution in Lake Tai
    - Top down policies of China's central government
  - Utilization of digestive juice
    - Japan's financial support
    - Japanese technology to utilize digestive juice

# 2. Answers to selected questions

- Key enabling factors
  - Governmental regulation of water pollution
  - Understanding of farmers to apply liquid fertilizer (digestive juice)
  - Economically feasible cost for applying liquid fertilizer for both piggeries and farmers

# 2. Answers to selected questions

- Achieved outcomes
  - Combination of two different policy and project




  - Achieves many benefits;
    - Improvement of water pollution
    - Reduction in waste treatment cost for piggeries
    - Reduction in fertilizer cost for farmers

# 2. Answers to selected questions

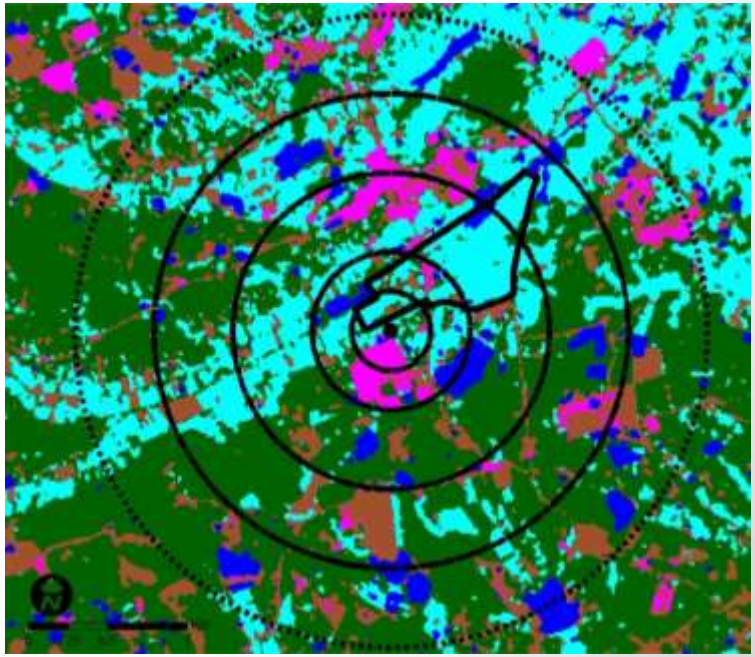
- Main challenges
  - Application of liquid fertilizer to arable crops: rice paddy is easy to apply liquid fertilizer, but arable land is not

# 2. Answers to selected questions

- Main challenges
  - Currently, piggeries receive no reward from farmers: farmers benefit without paying any cost
    - Because piggeries can reduce waste treatment cost
  - But some piggeries complain that farmers receive benefit with free of charge (free ride)
  - The government has to think how to balance the cost and benefit between piggeries and farmers

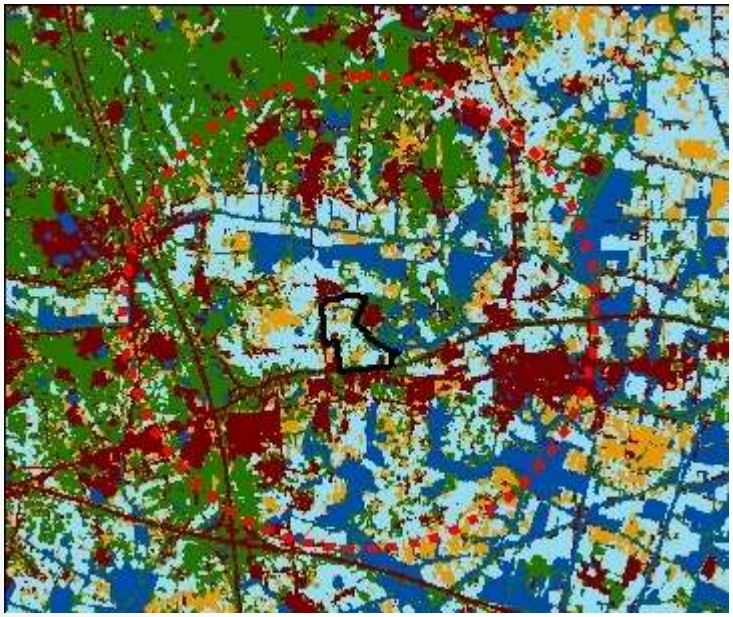
# 2. Answers to selected questions

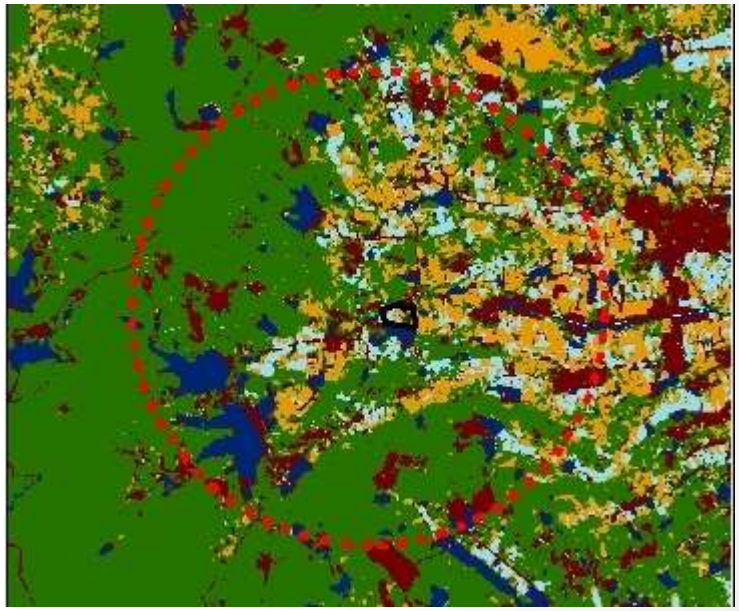
- Potential for scaling-up and replicability
  - How much digestive juice can consumed depends on whether there is enough arable land to accept digestive juice near piggeries
    - Pipe line supply is less expensive but constrained by geographic condition
      - Altitude
      - Existence of rivers and roads



# 2. Answers to selected questions

- Potential for scaling-up and replicability
  - We believe there is much room for scaling-up, but it heavily depends on localities





# Thank you very much for your kind attention

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