Morihiro Maeda

Principal Investigator of Soil Management Laboratory

Professor

Graduate School of Environmental and Life Science, Okayama University, Japan

Doctor of Engineering from Kyoto University

MAJORS

Soil Science, Environmental Engineering

RESEARCH INTERESTS

Organic waste management in soil
Greenhouse gases emissions from agricultural soil
Nitrogen leaching in upland fields
Renewable materials (Biochar, manure ash and others)
Sediment microbial fuel cells

TEACHING COURSES

Undergraduate level:	Soil Science/ Soil Quality and Management
Master level:	Soil Use and Management/Advanced Soil and Biogeochemistry for SDGs
Doctor level:	Soil Functions/ Water and Nutrient Cycling/ Chemistry for Environmental Sustainability

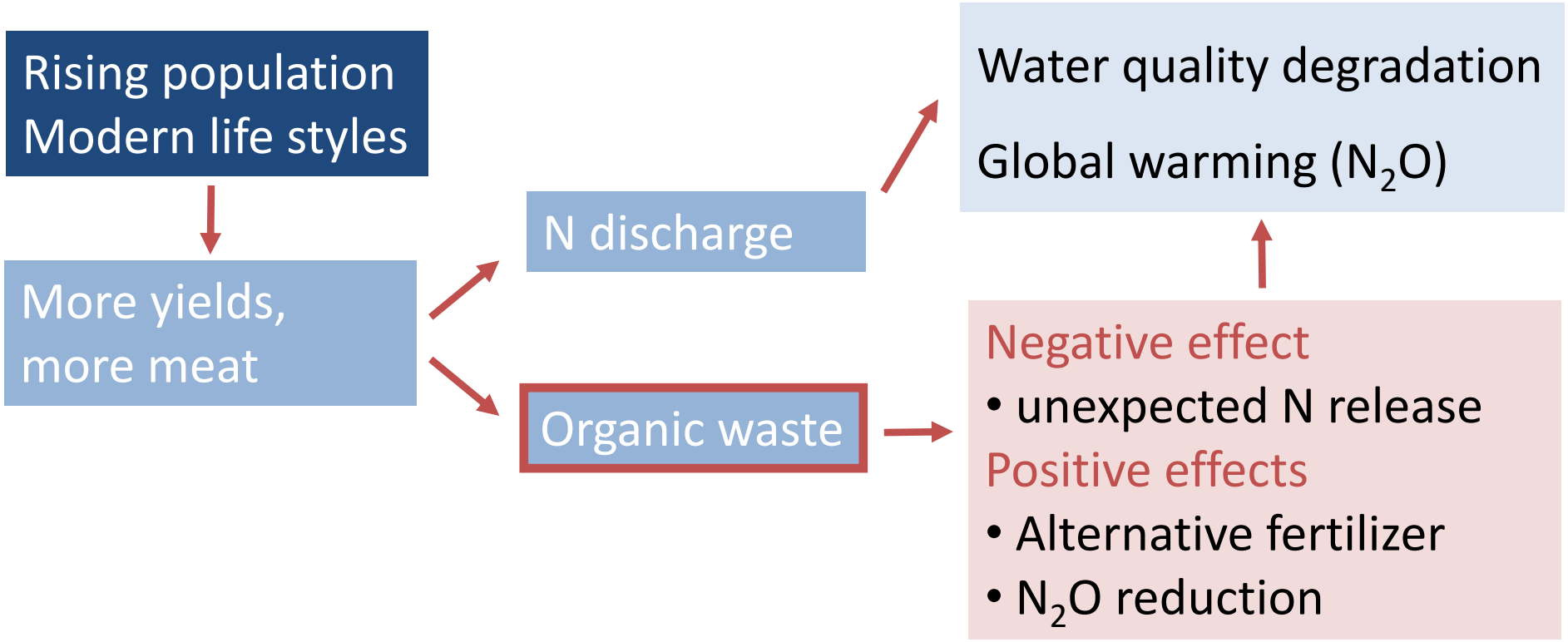
INTERNATIONAL ACTIVITIES

Chair (Div. Soil and the Environment), International Union of Soil Science; Journal Editors: Soil Science and Plant Nutrition, Hydrological Research Letters, etc.

岡山大学 OKAYAMA UNIVERSITY

Background of the studies

WiSe use of organic waste is a key to conservation of our future earth.



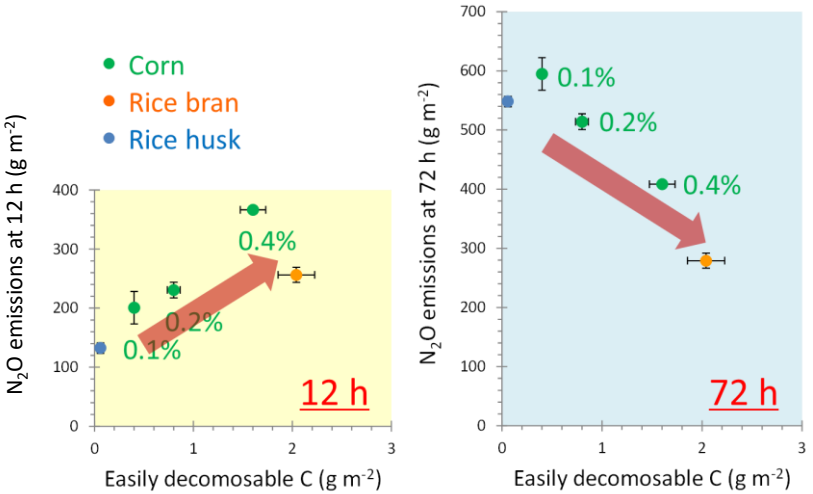
How to reduce greenhouse gas emissions from organic matter amended soil ?

Intensive Agriculture results in emissions of greenhouse gases such as carbon dioxide (CO_2) and nitrous oxide (N_2O) issued from biological processes like organic matter decomposition, nitrification and denitrification. It highly depends on organic matter inputs.

We investigate the effects of **organic matter amendment** on CO_2 and N_2O emissions. In particular, in agricultural soil amended with livestock compost.

Improved **organic matter management** is implemented in rural areas.

Inputs of organic matter are essential to maintain soil quality. In the greenhouse, rice husk was incorporated into the soil for soil fertility maintenance.



Rice bran and corn with more easily decomposable C enhanced N_2O emissions for the first 12 h, whereas N_2O emission rates reduced towards 72 h

Groundwater contamination with nitrogen in Central Vietnam

Nitrogen (N) is one of the main contributor to groundwater contamination in rural areas. Nitrate (NO_3^-) often contaminates groundwater when excess N is applied to farmland. In contrast, high concentrations of ammonium (NH_4^+) was detected in groundwater running underneath vegetable fields (Huong River area, Central **Vietnam)**.

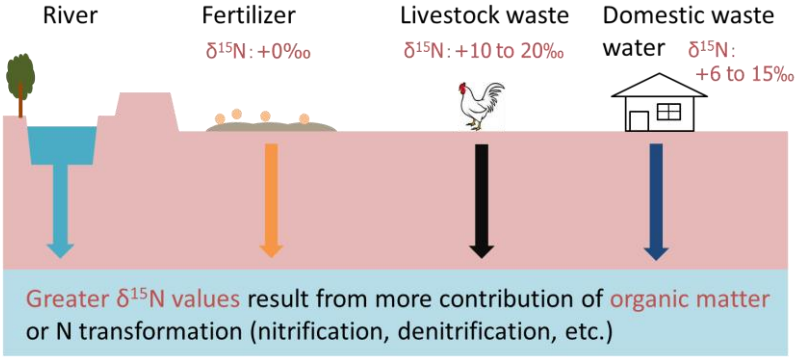
We investigated the **contamination sources** and **mechanisms** of N contamination in groundwater by using ^{15}N natural abundance and functional genes of microorganisms ➔ new method to collect NH_4-N, NO_3-N, and organic N in water and soil samples for $\delta^{15}N$ analysis. Functional genes like *narG*, *napA*, and *nosZ* are quantified to obtain information on nitrogen dynamics in **deep soil**.

Improved fertilizer and **manure** managements in rural areas of Central Vietnam according to **scientific evidences**.

Vegetable fields are very close to the residential area. Organic waste management is a key for sustainable agriculture in Central Vietnam

Indication from $\delta^{15}N$ values

$$\delta^{15}\mathrm{N}\ (‰) = \frac{\left(\frac{^{15}\mathrm{N}}{^{14}\mathrm{N}}\right)_{\mathrm{sample}} - \left(\frac{^{15}\mathrm{N}}{^{14}\mathrm{N}}\right)_{\mathrm{air}}}{\left(\frac{^{15}\mathrm{N}}{^{14}\mathrm{N}}\right)_{\mathrm{air}}} \times 1000$$



International collaboration projects

- ✓ Identification of nitrogen contamination mechanisms of groundwater in coastal areas of Central Vietnam by using microbial technologies and stable isotope analyses (JSPS Grant-in-Aid for Scientific Research, 2015-2017)

- ✓ Proposal of sustainable composting methods based on the reevaluation of Vietnamese indigenous compost from viewpoints of its functions and environmental loadings (JSPS Fostering Joint International Research, 2020-2023)

- ✓ Development of sediment microbial fuel cells for water quality improvement in shrimp ponds and small-scale energy power generation in Central Vietnam (JSPS Bilateral Joint Research Projects, 2021-2022)

Welcome !!

Combining environmental science and engineering for a **green future**.