HOKKAIDO UNIVERSITY

Title	Seasonal change of nitrogen cycling in Hichirippu lagoon: Get tough for sustainable use of the coastal area.
Author(s)	Ishimaru, Natsumi; Sekiguchi, Ikue
Relation	第2回北海道大学サステナビリティ学生研究ポスターコンテスト = The Second Hokkaido University Sustainability Research Poster Contest. 平成22年10月24日（日） - 11月5日（金）. 北海道大学学術交流会館, 札幌市.
Issue Date	2010-10-24
Doc URL	https://hdl.handle.net/2115/44151
Type	conference presentation
File Information	C6-7.pdf

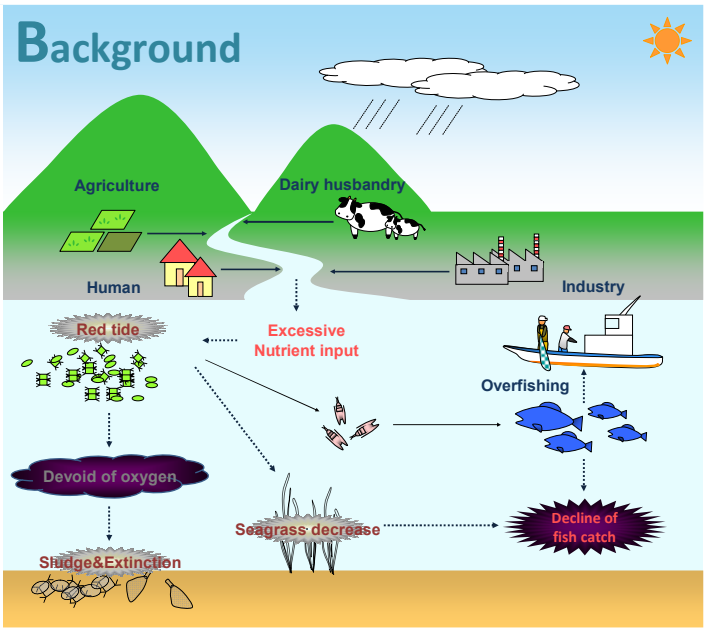
Hokkaido University Collection of Scholarly and Academic Papers : HUSCAP

C6-7

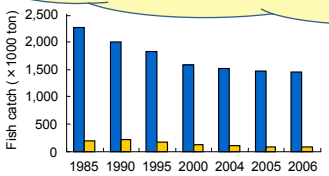
Seasonal change of nitrogen cycling in Hichirippu-lagoon: Get tough for sustainable use of the coastal area

Natsumi Ishimaru, Ikue Sekiguchi
Graduate School of Environmental Science, Hokkaido University

Background



Coastal problems are increasing!
Can we learn from unpolluted ecosystem?



The most of researches have been conducted on polluted area in the face of problems…

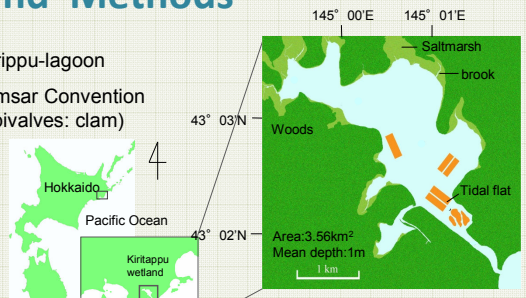
- Coastal fishery
- Inland water fishery

Materials and Methods

Study area

Unpolluted estuary, Hichirippu-lagoon

- Wetland under the Ramsar Convention
- Fish catch: 90 ton/yr (bivalves: clam)

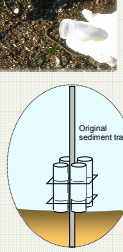


Sampling schedule

Bimonthly sampling
April 2003-present

Sample collection

- Migratory birds: Number of species, population
- Excretion of migratory birds: Nitrogen content, $\delta^{13}C$
- Water samples: Chlorophyll *a*, $\delta^{13}C$ and
  - PON: Particulate organic nitrogen
  - DON: Dissolved organic nitrogen
  - DIN: Dissolved inorganic nitrogen
- Sediment samples(0-0.5cm): Chlorophyll a, Water contents, $\delta^{13}C$
- Bacteria abundance (DAPI staining)
- Zooplankton abundance: Dry weight, Nitrogen content
- Sinking particle: Chlorophyll a, PON, $\delta^{13}C$



Flux estimation

- DIN inflow flux (36 hours survey)
- Sinking particle flux using sediment trap
- Nitrogen uptake rate and excretion rate of migratory birds
- DIN uptake rate, DON release rate of seagrass (*Zostera marina L.*)

Results and Discussion

Question1

In Hichirippu-lagoon,
Which of the biological process is supporting the bird's population and fish catch?

Answer 1: Benthic ecosystem (Benthic micro algae and seagrass)

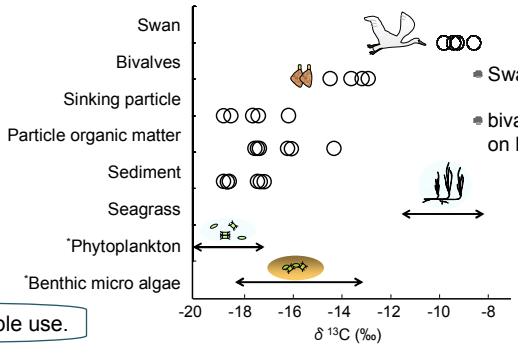
⇔ In polluted area: Benthic ecosystem has been destroyed !

Question2

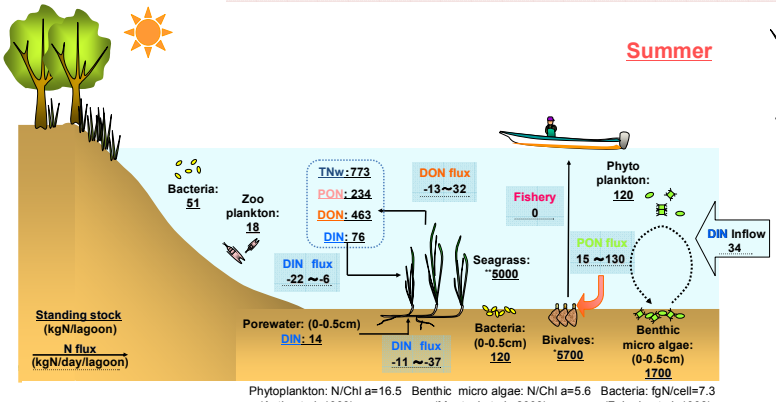
Nitrogen budget in Hichirippu-lagoon is considered well-balanced?

Answer 2: The mass balance of Hichirippu lagoon is perfect for sustainable use.

⇔ In polluted area: Excessive nutrient (DIN) input and overfishing

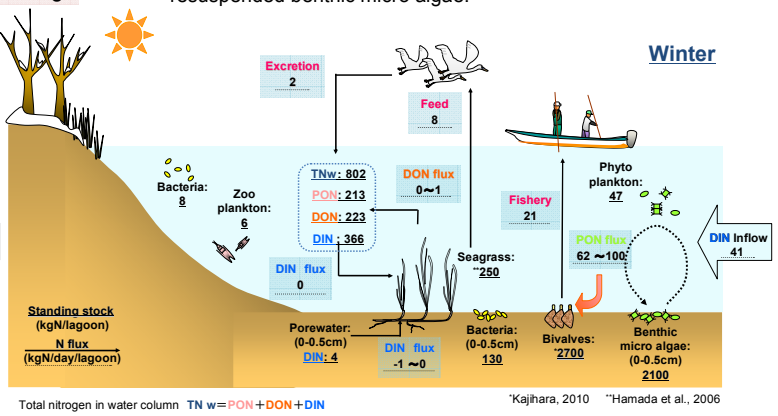


- Swans feed on seagrass.
- bivalves (filter feeder) feed on benthic micro algae.
- The $\delta^{13}C$ of sinking particle suggests that it is sourced from resuspended benthic micro algae.



Phytoplankton: N/Chl a=16.5 (Antia et al.,1963) Benthic micro algae: N/Chl a=5.6 (Montani et al., 2003) Bacteria: fgN/cell=7.3 (Fukuda et al.,1998)

- Resuspension of benthic micro algae is a major contributor to nitrogen cycling.
- Bivalves filtrate overlying water and feed resuspended benthic micro algae.



Total nitrogen in water column TN w=PON+DON+DIN

*Kajihara, 2010 **Hamada et al., 2006

- Nitrogen outflow (feed, fishery) is nearly equal to DIN inflow.
- Nitrogen flux of seagrass is controlling seasonal variation.

These results suggest 2 recommendations for coastal problems.

- To restore benthic ecosystem
- Maintenance of mass balance (nutrient inflow and fish catch)

Yes, we should learn from unpolluted area!