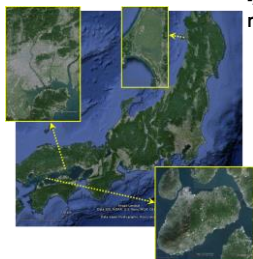


Workshop: Creation of Environmental Peace Science  
 ~Future Prospect of Urban-Rural link ~

# 農業流域における 水-物質再利用システム

-A hybrid water/nutrient resources  
recycle system in agriculture watershed



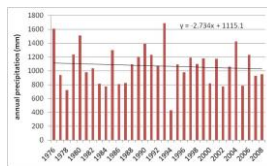
金 广哲 (総合科学研究科PD)  
 齋藤光代 (岡山大学)  
 小野寺真一 (広島大学)

2015 Sep-4th

## 1. The problems of water environment in Seto Inland Sea

① Climate change (drought impact)

water resource crisis → Agriculture crisis

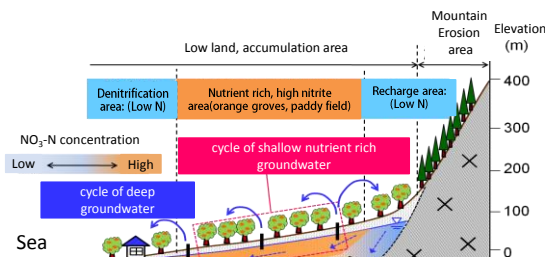


② Water quality worsen in water bodies, agriculture ponds (pollution, eutrophication)

Grants-in-Aid for Scientific Research A (2013-2015)  
 Representing: Prof. Onodera

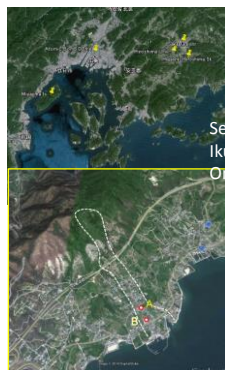


## A hybrid water/nitrogen resources recycle system better sustainable using of groundwater resources



Not in all watershed: not fit for low Nitrogen concentration  
 Share with good wells: deep groundwater < shallow groundwater

## Research catchment in Setoda, Onomichi



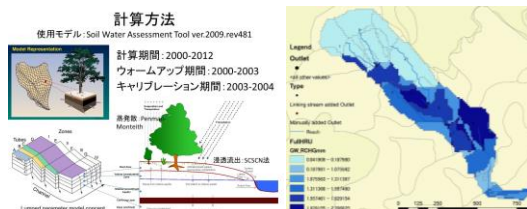
Setoda Cho, Ikuchi Island, Onomichi

- Long term experiments-10 years
- nutrient cycle in river-groundwater systems
- Lemon production No.1



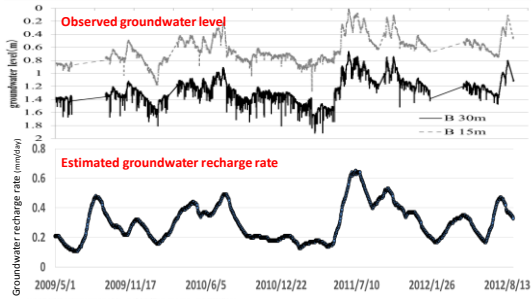
## How much can it be used ?

- Hydrological model & discharge data (observed) / meteorological data
- Water budget in watershed (Precipitation = Evapotranspiration + river discharge + groundwater recharge) based on time scale

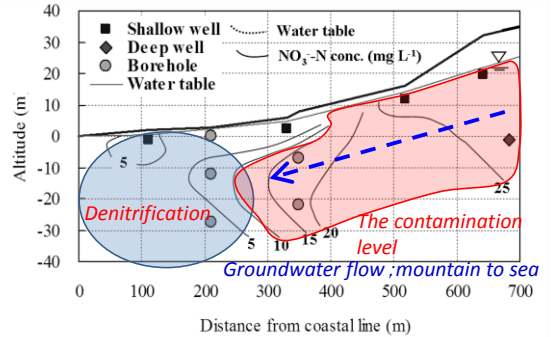


## How much can it be used ?

Annual groundwater recharge 400mm (30-40% of annual precipitation =sustainable water resources



## NO<sub>3</sub>-N concentration in ground water (Kankitsu agriculture area)



## Groundwater pumping- N fertilizer amount

**Research fund: 700.000 Yen/10ares**

**Mulching (waterproof sheet) preventing low nutrient filtering, protect high concentration for drip irrigation**

The diagram illustrates a drip irrigation system layout. It includes a '水塔タンク' (water tower tank), 'ディスクフィルタ' (disk filter), 'ポンプ' (pump), and 'ディストリビューションパイプ' (distribution pipe). It shows 'マルチシート' (mulch sheets) covering the ground between rows of plants. Dimensions for row length (25m) and row spacing (2.5m) are provided.

## Summary

- a hybrid water/nitrogen resources recycle system can be built
  - Scenario
  - Effectiveness-validate, on site experiments
- Research theme ;
  - Popularize ; high installation cost
  - Consider phosphorus by model
  - Population ageing, allelogenesis (social problem)

