



Water Quality Group Reporting

Ongoing Activities

- **Professor Furumai's Hue project focusing on flood simulation and WQ monitoring in Citadel area. In the next rainy season, they plan to conduct wet weather monitoring including sampling during inundation.**
- **Professor Bilqis's study on 'Droughts and water quality in drinking water management' is ongoing in selected Southern coastal villages of Bangladesh. The first Phase will be completed in 2012 September.**
- **The WQ proposal by Professors Furumai, Bilqis and WQ Group to APN is awaiting response**

In Hue, Vietnam

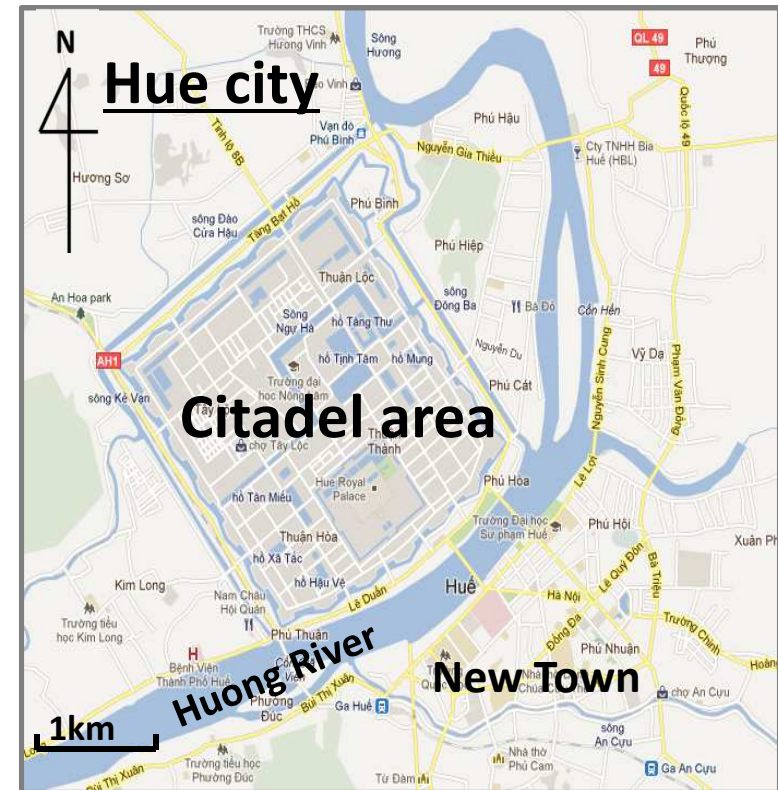
Background

In the Citadel area of Hue city, urban inundation occurs several times a year due to the limited capacity of the drainage system in rainy season.

Channels and ponds are one of hydraulic features of drainage system.

- Water flow in the Citadel area is complicated because of connections of channels and ponds.
- They are polluted by receiving untreated wastewater from households.

In case of inundation, the polluted drainage channels and ponds can be a non-negligible source of pathogens, which is related to health risk.



In Hue, Vietnam

Objectives

Research objectives are as follows:

In field survey,

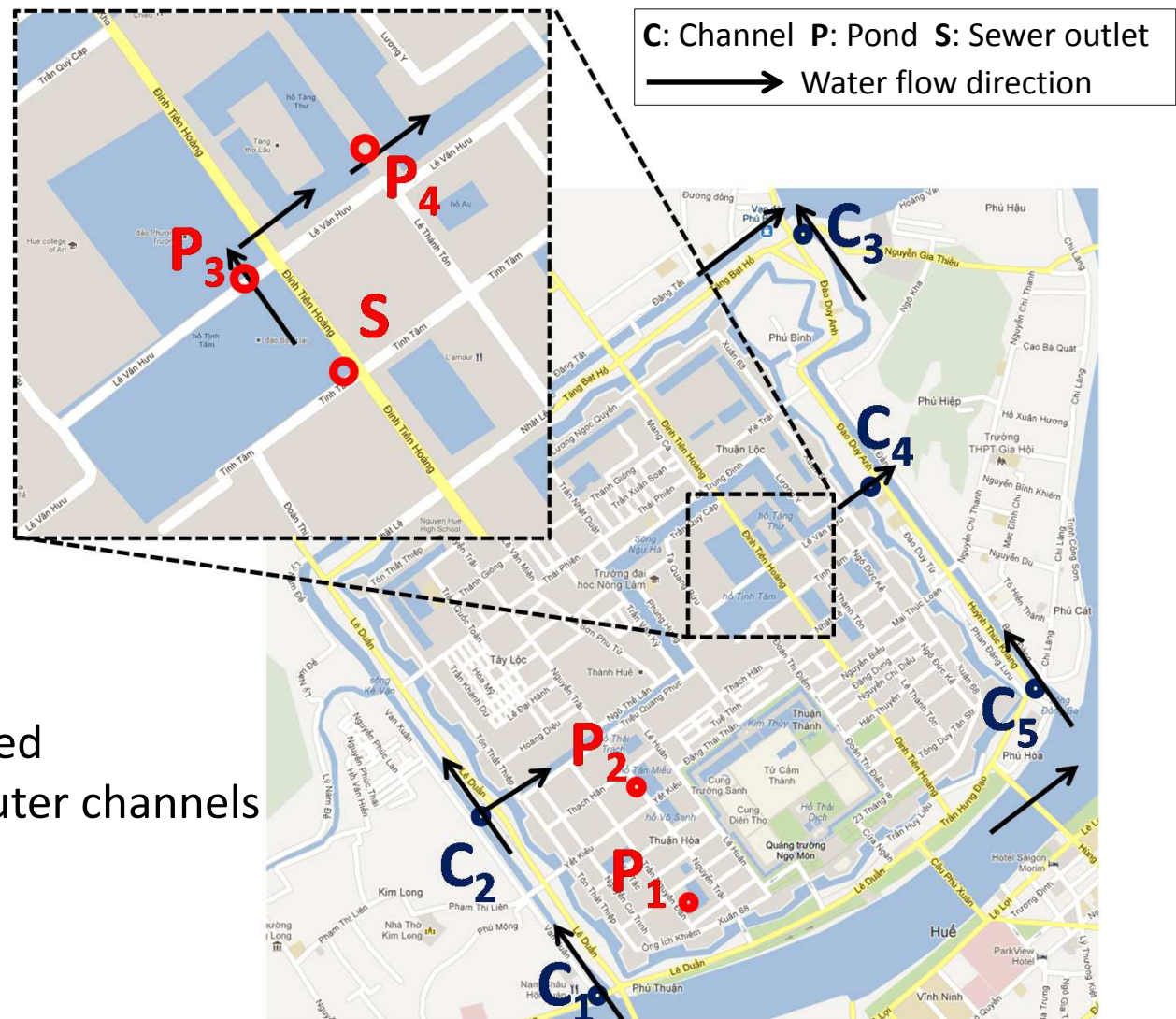
- **To investigate the connections between the drainage channels, ponds and sewer pipes.**
- **To establish the drainage system data for inundation analysis.**
- **To evaluate fecal contamination and to investigate how water quality parameters are correlated with each others.**

After the survey,

- **To conduct inundation simulation with the elaborated input data and to compare the simulation result with a past flow record.**

In Hue, Vietnam

Survey points



On Feb.19th and 20th in 2012 during dry weather period, water sampling was conducted at 4 ponds, 5 points of the outer channels and at an sewer outlet.

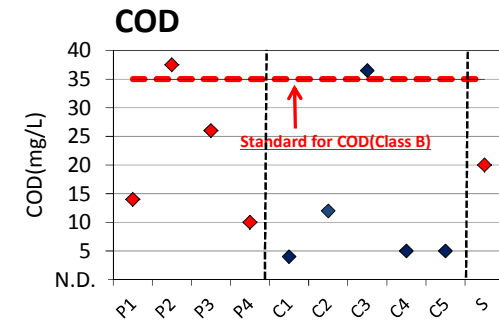
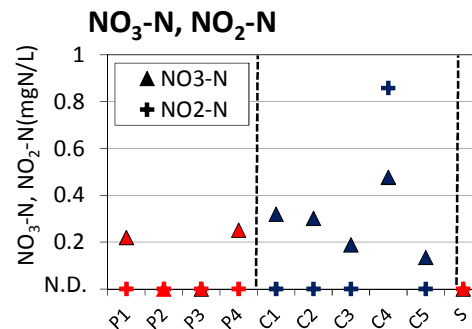
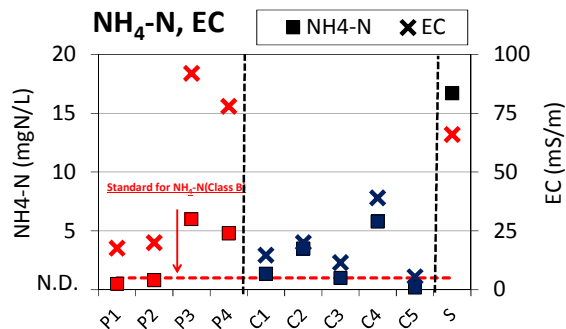
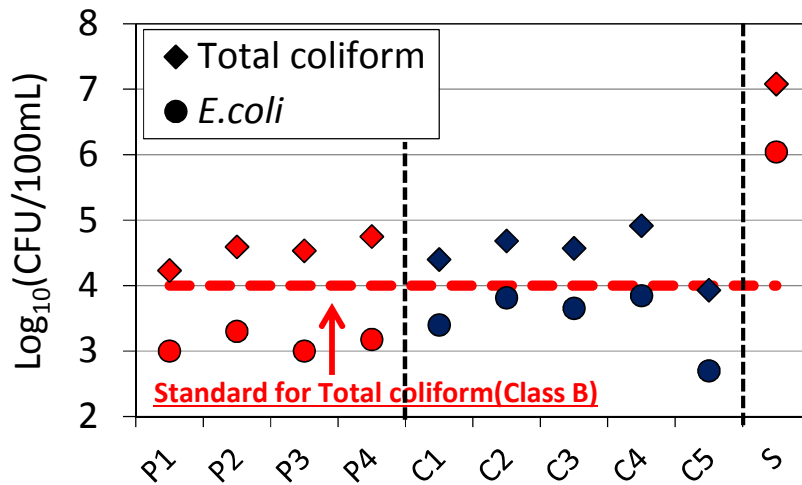
In Hue, Vietnam

Water quality data

E.coli, Total coliform, $\text{NH}_4\text{-N}$, $\text{NO}_3\text{-N}$, $\text{NO}_2\text{-N}$, COD and EC were measured.

Severe fecal contamination was observed in channels and ponds.

Fecal indicators

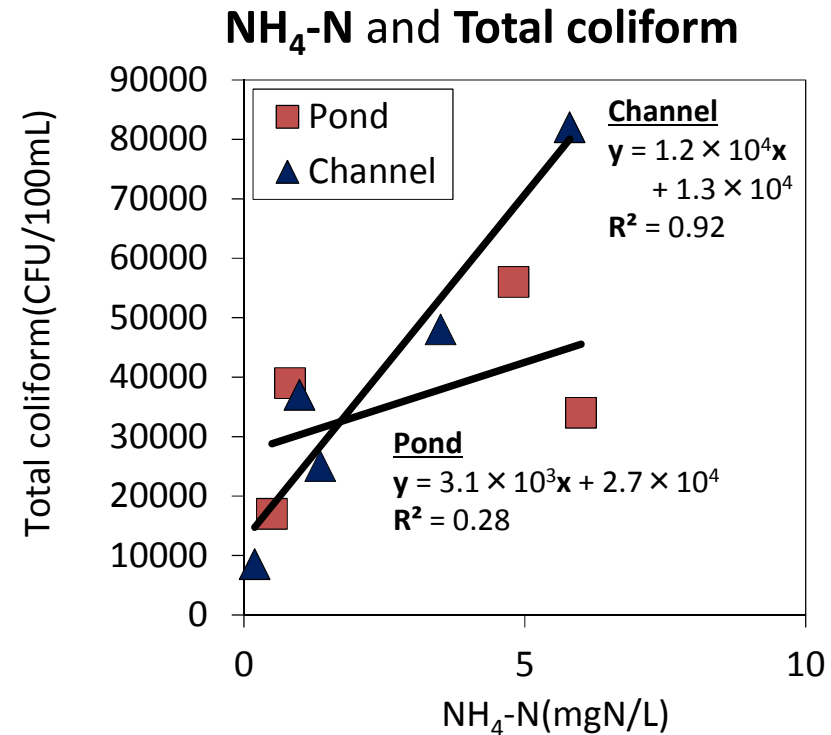
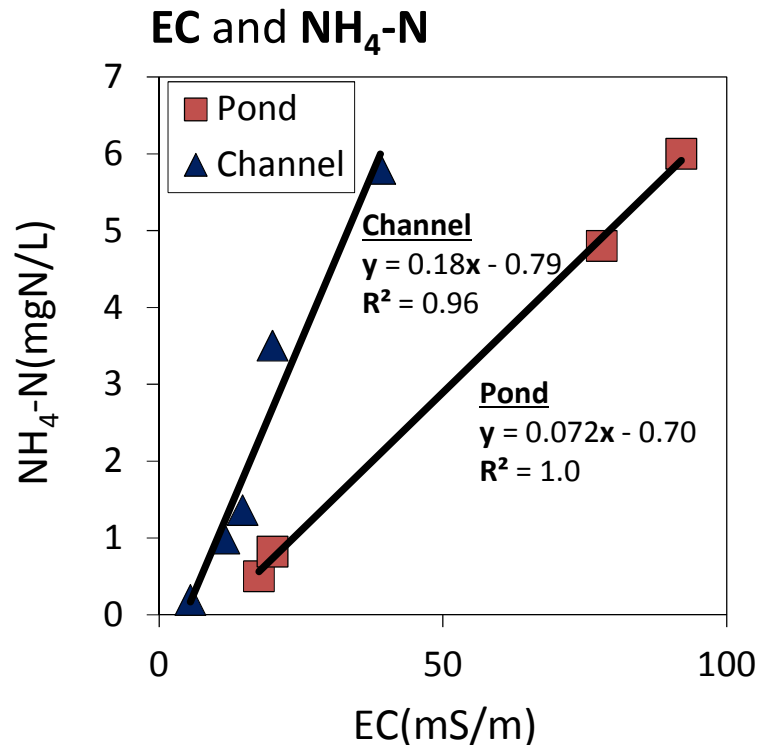


In Hue, Vietnam

Regression analysis

Regression analysis showed that EC and NH₄-N were highly correlated at both channels and ponds.

On the other hand, high correlation between NH₄-N and Total coliform was observed only at channels.

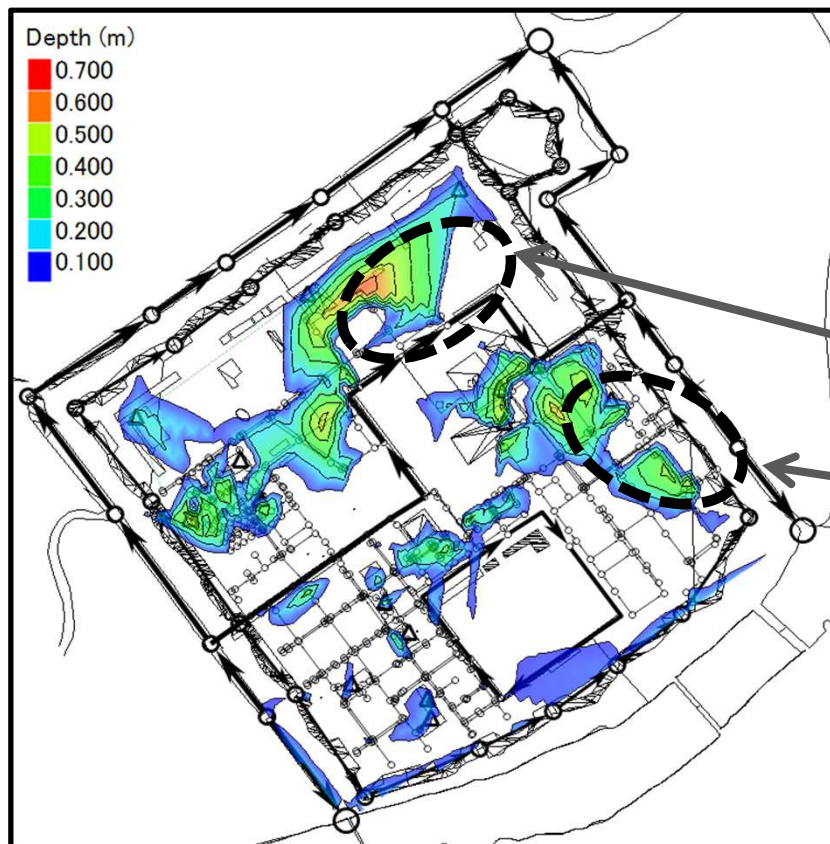


In Hue, Vietnam

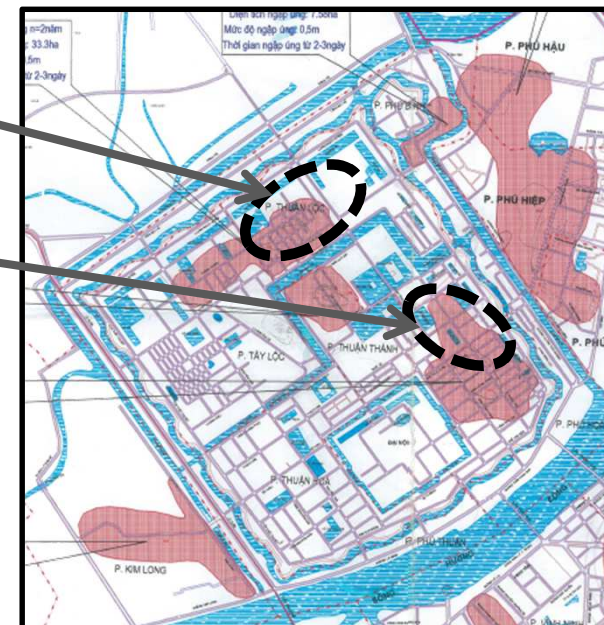
Comparison with the past inundation map

Inundation simulation was conducted in the Citadel area by XPSWMM.
Newly obtained information on channels, ponds and their connections was given to the input drainage data .

Simulation results



Past inundation record



In Hue, Vietnam

Conclusions

- Water flow and severe fecal contamination were observed. Regression analysis shows that EC and NH₄-N was highly correlated both at channels and ponds, NH₄-N and Total coliform was highly correlated only at channels.
- Inundation simulation results were compared to the past inundation record. The simulation results explained well the inundation pattern in the record.

In Bangladesh

The following projects have been started to integrate water quality and remote sensing to understand environmental health:

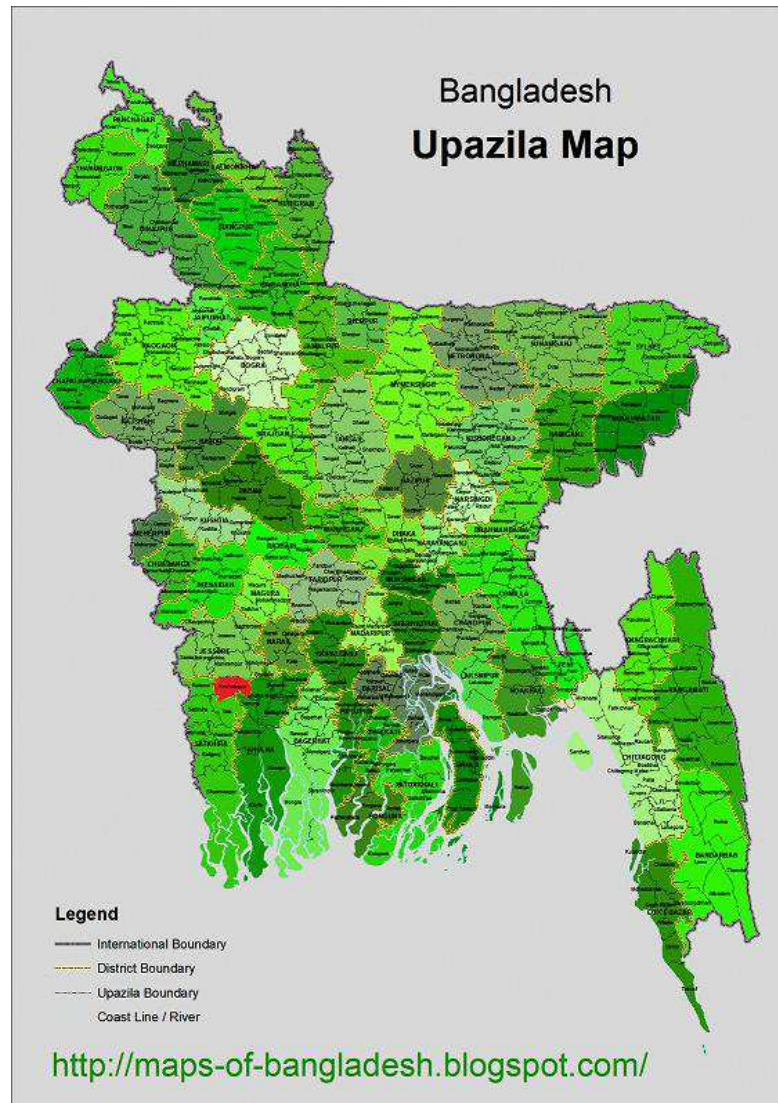
- i) P1--Study of the land cover and watershed changes and their impacts on health, agriculture, land-use and livelihood in Modhumoti river basin: a case study from Bangladesh. Funded by Uttara University
- ii) P-2: Safe drinking water supply, environmental health and integrated water resources management inside South West Project. Funded by ADB, the Netherland Embassy and Government of Bangladesh.
- iii) P-3: An international conference to bridge poetry and science on climate change adaptation. Funded by Uttara University, World Bank and others

Study of the land cover and watershed changes and their impacts on health, agriculture, land-use and livelihood in Modhumoti river basin: a case study from Bangladesh.

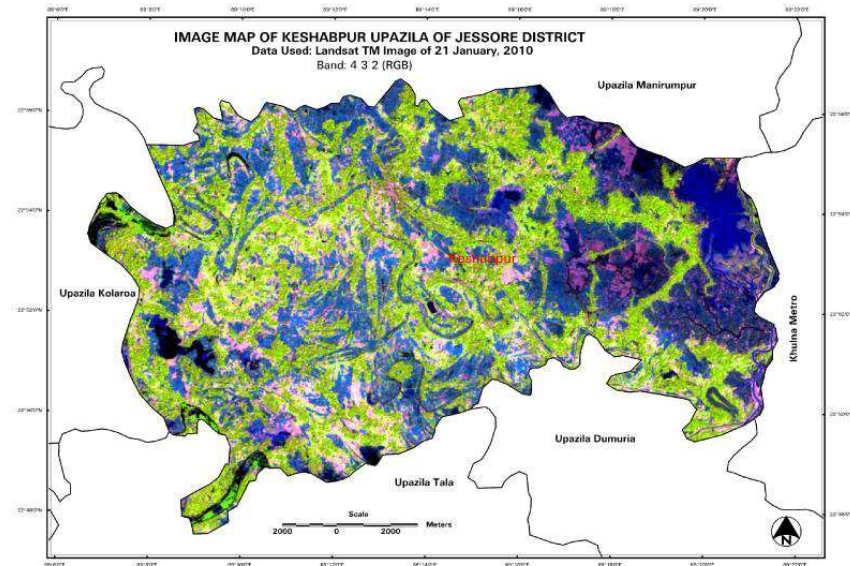
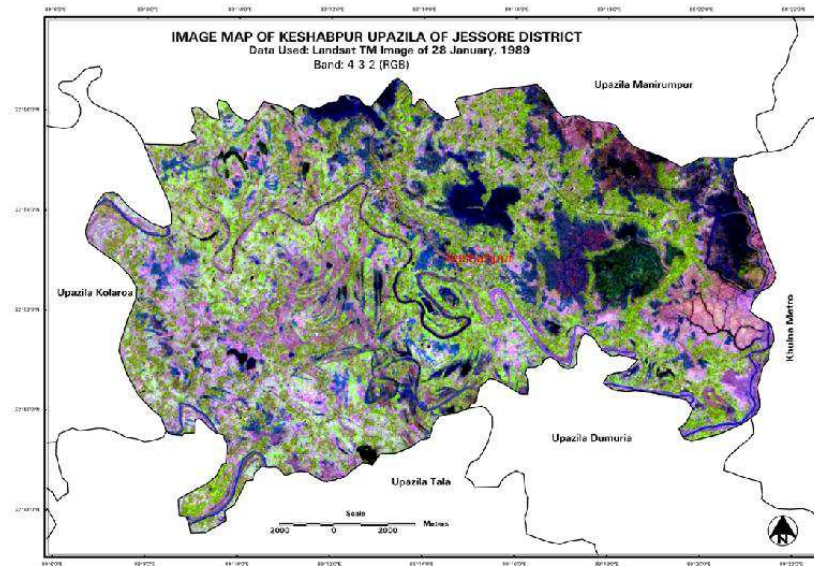
Objectives

- i) To study the land cover and land-use change in Kesobpur of Jessore district and link with the reported impacts of the changes on the resources, drinking water, sanitation and livelihood.
- ii) To compare the changes as observed in the poetry and scientific information

P-1: Map of Bangladesh showing the study upazazila Keshabput (red) of Jessore district



The raw images from Landsat TM (Bands 2,3,4) for the Keshabpur upazila for 21 January 1989 (a-upper panel) and 25 January 2010 (b-lower panel).



P-1: Preliminary results

- i) The thematic maps show that the water area has almost doubled and the bare soil and vegetation cover has become nearly halve in 2010 compared to 1989. This is due to the water logging caused by the decrease of the drainage capacity of the river Kapatakka.
- ii) Arsenic and salinity concentration of water resources combined with water logging significantly affected the water use for livelihood and agriculture.

P-2 and P-3 in Bangladesh

- P-2; completed arsenic screening and GPS data collection from about 19000 tube-wells inside SW project. Also completed formation of IWRM/water management groups in about 95 hydrological units inside the SW embankment.
- P-3: conference to be held on 5-6 January 2013 in Dhaka, Bangladesh. Preparation of key papers based on poetry, satellite images and other scientific data ongoing. YOU ARE INVITED.