

2008 ITP Project Report

Research at Department of Water Resources Engineering, Lund University, Sweden



(The botanical garden of Lund University)

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Program institute: Department of Water Resources Engineering, Lund University

Program period: 2008/10/18-2009/1/30

Research theme: “Studying of Submarine Groundwater Discharge Estimation method
using Water Balance Analysis”

The author studied at Lund University in Sweden for 3 months supported by ITP 2008 project. In the present paper, abstract of the study in Lund University and accomplishments are reported as follows.

1. Life in Lund

Lund University is located in Lund City at south part of Sweden, which has various kinds of faculties such as Engineering, Science, Literature and Business. Since the Engineering was founded as one of the earliest faculty in the university, it is especially referred “Lunds Tekniska Hogskola (LTH)”. The author studied in Department of Water Resources Engineering (in Swedish, Teknisk Vattenresurslara; TVRL) in LTH as a guest research student supervised by Prof. Ronny Berndtsson. **Picture 1** shows the building of the department (v standing for “vag” and “vatten”, which mean road and water in English respectively). Every weekday, “coffee break” was held at 9:30 a.m. and 2:30 p.m. at the coffee room in the 4th floor of the building. This break is not only for just relaxing or taking a break but also sometimes giving a presentation about research for Ph.D students and staffs. Therefore, from both points of view, daily and scientific conversation, it was a significant opportunity for the author to practice English. As seen in **Picture 2**, a PC and private desk were arranged by the department, which helped author to concentrate on the study.



Picture 1 The building of TVRL, LTH (vag och vatten huset)



Picture 2 The author’s desk (the bicycle could be rent from department).

2. Research

Submarine groundwater discharge was studied using numerical simulation model. The analysis was conducted using a groundwater flow model developed in Japan to estimate submarine groundwater discharge. FORTRAN source code was applied for the modeling to analyze water balance of Kikuchi River Basin in Japan.

Besides, author tried to apply the groundwater flow model to Swedish river basin. As the beginning of the step, several data was collected from Swedish Meteorological and Hydrological Institute. According to the discussion with Dr. Jonas Olsson in SMHI, Ljungbyan River Basin (**Figure 1**) was selected as the representative study area and meteorological, hydrological and GIS data of the basin were collected and organized. In the future, the modified numerical model will be developed and applied to estimate water balance in this basin.

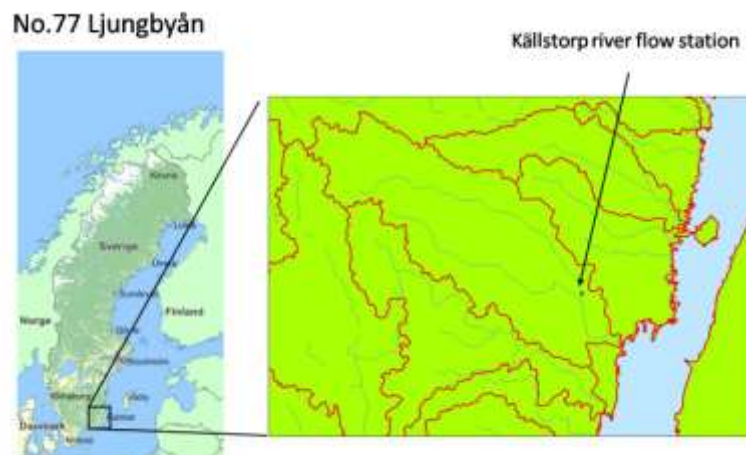


Figure 1 Location of Ljungbyan river basin in Sweden.

3. Lecture

Author took the Ph.D and master level course, “Advanced Hydrology” from 29th October. This is an international course conducted by several professors of TVRL such as Prof. Lars Bengtsson, Cintia Bartacchi Uvo and Magnus Persson, Justyna Berndtsson focusing on the basic theory and practices of hydrology. Participate students should take not only classes but also “Essay work” as a review of scientific paper and “Assignment work” as individual group research practicing. Author choose an essay theme of “Water balance and nutrients inputs to the Baltic Sea” supervised by Prof. Ronny Berndtsson. Review of papers (5 pages) and 15 minute presentation (on 26th November, 2008) were given for the theme. For the assignment work, author studied “interpolation of observed flood river discharge using statistic methods.” collaborated with Hossein Hashemi, a Ph.D student from Iran. This assignment work was supervised by Prof. Cintia Bartacchi Uvo of TVRL and Prof. Robi Clark, a guest researcher from Instituto de Pesquisas Hidraulics, Porto Alegre-RS, Brazil. Author and Mr. Hashemi analyzed river discharge data of Bishe Zard River in Iran which has dry periods for 20 years. The Mann-Kendall method using FORTRAN numerical source code was applied to indicate a variance trend during the study period.

Besides, author took the examination for the course on 12th December, 2008. The contents were about snow hydrology, soil mechanics, urban hydrology and statistic meteorology. The grade was evaluated according to 25% for essay presentation, 50% for paper examination and 25% for assignment.

4. Paper submission for a scientific journal

A scientific paper was submitted to an international journal, “Hydrology Reseach” (front page is shown in **Figure 2**). The author had several discussions about the paper with Prof. Ronny Berndtsson to establish appropriate contents, such as results and scientific English sentences. Before the submission, the draft paper was sent to co-authors in Japan and e-mail discussion was conducted. The paper was submitted from the web page (<https://www.editorialmanager.com/hydrology/default.asp>) on 11th December, 2008, which is the currently under review.



Figure 2 The front page of “Hydrology Research”.

5. Poster submission for an international conference

A poster and proceeding paper were submitted for “International Symposium on Earth Science and Technology 2008” held during 1st to 2nd December, 2008. The contents of a poster and paper were revised several times according to the discussions with co-authors including Prof. Ronny Berndtsson and Prof. Jinno Kenji.

6. Presentation at the TVRL

A presentation was given for the staffs and students of the TVRL by author on 14th January, 2009. This oral 15 minutes presentation was mainly focusing on background of SGD (Submarine Groundwater Discharge) study and results obtained so far. 10 people participated on the day, who was quite enthusiastic for the discussions, in spite of having different backgrounds, such as coastal engineering, urban hydrology etc. This presentation was quite significant opportunity as to gain a new knowledge from different point of views. (Picture 3 to 5)



Picture 3 The call for author’s presentation on the bulletin monitor at the department entrance.



Picture 4 Presenting author at the conference room.



Picture 5 Author and participants of the presentation

7. Thesis writing and presentation

A master thesis (50 pages) was written as a summary of study in TVRL, which was submitted to an official web-based publishing system of Lund University named “XERXES” (<http://theses.lub.lu.se/undergrad/>). Besides, a presentation for the thesis was given by author on 26th January, 2009. 25 minutes presentation and 15 minutes defense was conducted supervised by Prof. Ronny Berndtsson, examined by Linus Zhang. An opponent for the presentation was Mr. Ryosuke Furuno, from Toyohashi University of Technology. Author could obtain important inspirations for the next study plan from the discussion. After this defense, 30 ETCS credits were given to author as an accomplishment of “project study work” (**Figure 4**).

Examensarbete
TVVR 09/5002

Submarine Groundwater Discharge
Estimation from Kikuchi River
Basin to the Ariake Bay, Japan

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Figure 3 Front page of the submitted thesis

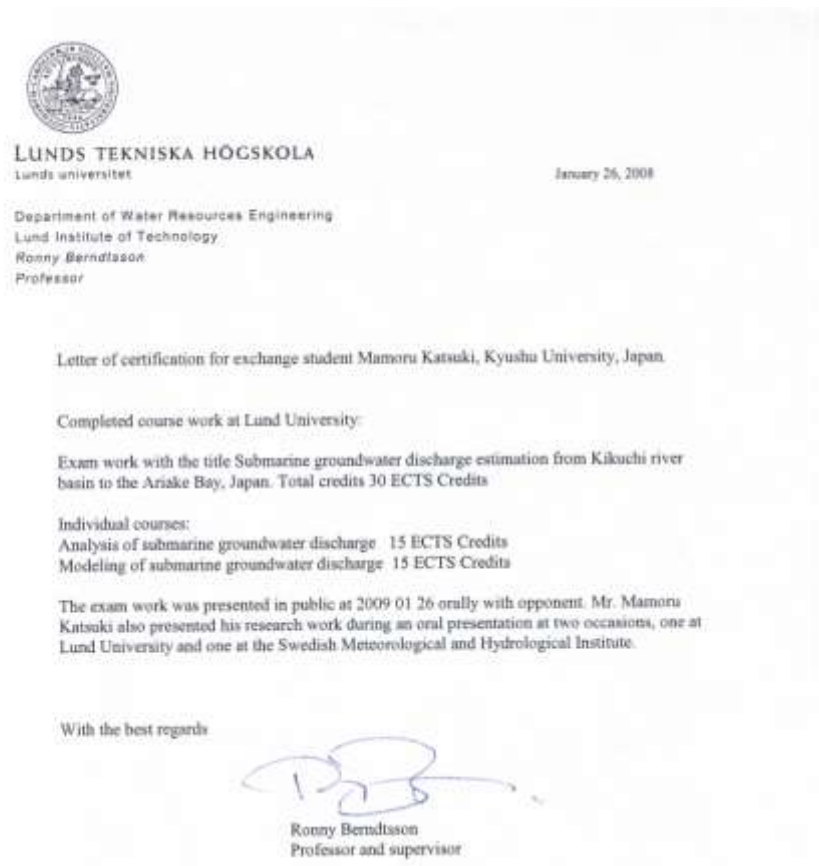


Figure 4 Certification for the credits by individual research courses