

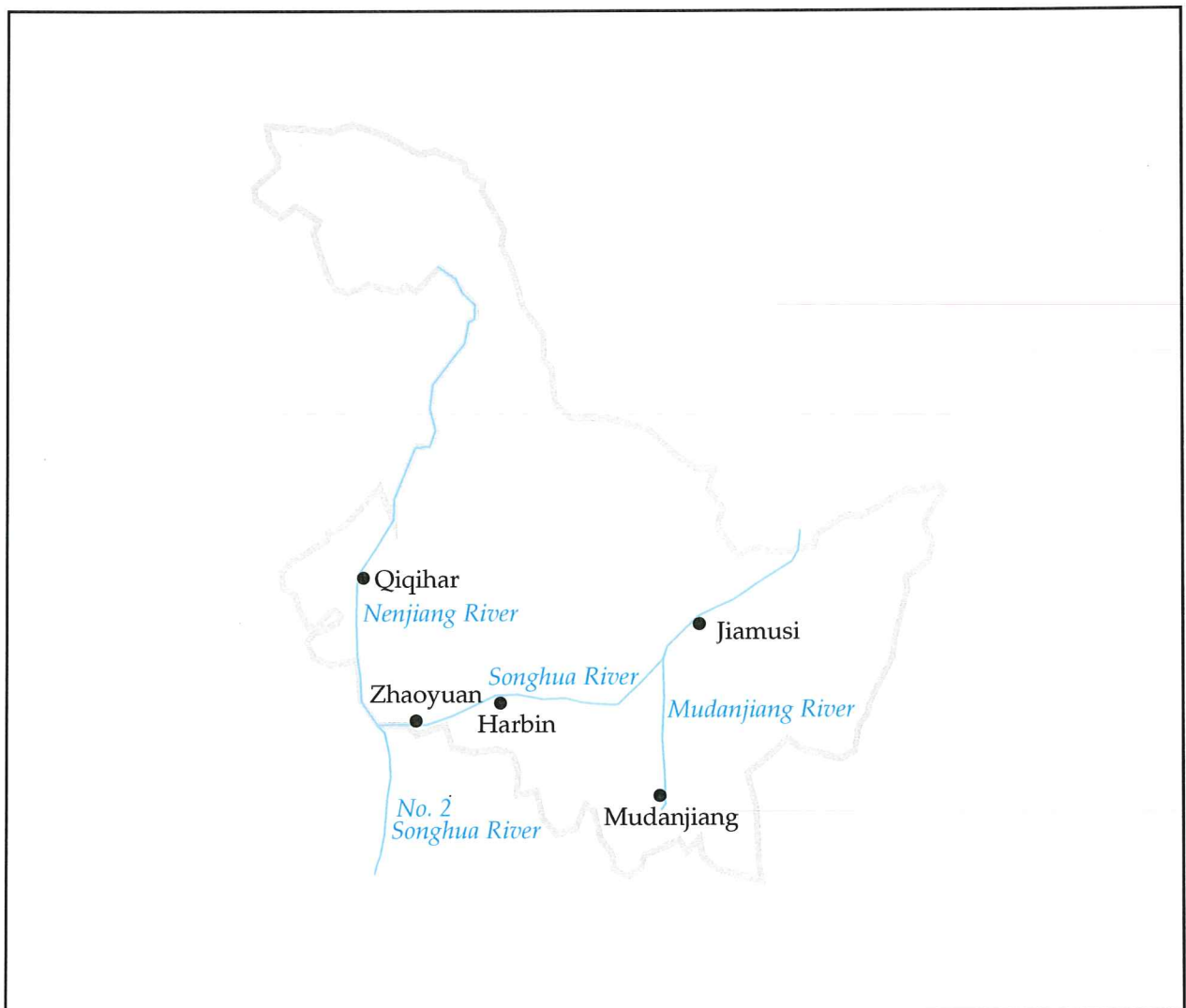
NIVA



REPORT SNO 4206-2000

**S**urveillancce of Water  
Quality in the Songhua  
River System in  
Heilongjiang Province,  
P.R. of China, CHN 017

Input to the 1999 Annual Report



Norwegian Institute for Water Research

# REPORT

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Abstract This report describes status of the project work performed during 1999 on "Surveillance of Water Quality in the Songhua River System in Heilongjiang Province, P.R. of China". Main topics are status for preparing the abatement strategy, installation of the ENSIS system combined with training and use, project workshops and meetings. Project costs in 1999 and the project budget for 2000 are shown.
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**Surveillance of Water Quality in the Songhua River  
System in the Heilongjiang Province, P.R. of China**  
CHN 017

Input to the 1999 Annual Report

## Preface

The project "Surveillance of the Water Quality in the Songhua River System in Heilongjiang Province, P.R. of China" was launched in November 1996, when an agreement was signed between the Norwegian Agency for Development Co-operation (NORAD) and The Chinese State Science and Technology Commission (SSTC).

The executive institutions of the project are from China, the Heilongjiang Environmental Protection Bureau (HEPB) and the Heilongjiang Environmental Monitoring Central Station (HEMCS). From Norway the co-operative institutions are the Norwegian Institute for Water Research (NIVA) and the NORGIT Centre.

Being amongst the first projects under the agreement between China and Norway for co-operation on environmental matters, this project, in addition to the normal project activities, has contributed in establishing management routines for project handling. These activities have taken both time and consideration, but are important activities that hopefully will be of benefit for the future co-operative projects between China and Norway.

In this report the main efforts through 1999 from the Norwegian project team are described. The year 1999 was the third full working year of the project. The document provides input information to the Annual Report to be prepared by the Chinese partners of the project

Participants in the Norwegian project team in 1999 are:

Ms Kjersti Dagestad,	NIVA
Mr Tor Haakon Bakken	NIVA
Mr Stig Borgvang	NIVA
Mr Jon Lasse Bratlie	NIVA
Mr Håvard Hovinn	NIVA
Mr Arne Veidel	NIVA
Mr Morten Willbergh	NIVA
Ms Bente M. Wathne	NIVA
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Mr Torsetin Skancke	Norgit

Oslo, 25. February 2000

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## Summary

The project "Surveillance of the Water Quality in the Songhua River System in Heilongjiang Province, P.R. of China" was launched in November 1996, when an agreement was signed between the Norwegian Agency for Development Co-operation (NORAD) and The Chinese State Science and Technology Commission (SSTC).

The executive institutions of the project are from China, the Heilongjiang Environmental Protection Bureau (HEPB) and the Heilongjiang Environmental Monitoring Central Station (HEMCS). From Norway the co-operative institutions are the Norwegian Institute for Water Research (NIVA) and the NORGIT Centre.

The year 1999 was the third full working year of the project. This document provides input information to the Annual Report to be prepared by the Chinese partners of the project.

### Project work 1999

#### *Main events*

Project work has been carried out both in China and Norway throughout 1999, and the following main events have taken place:

- January 1999, Training in Oslo for Chinese experts
- February -April, 1999, Adaptation and testing of the Chinese version of ENSIS in Norway
- March 1999, ENSIS installation on PC for training in Harbin
- April 1999, Workshop in Harbin/Mudanjiang, including installation of the first part of the Chinese version of ENSIS
- April 1999, Installation of, and training on water quality instruments
- May - October 1999, Modification of ENSIS
- September 1999, Mission to Mudanjiang for case study on abatement strategy
- October 1999, Workshop on data input an training in Harbin
- November 1999, Project meeting in Harbin

#### *Training in Norway*

A joint group from HEPB/HEMCS and the equivalent from Yantai Environmental Protection Bureau and Monitoring Centre (from CHN 014), visited NIVA and the Norwegian Institute for Air Research (NILU) for training, exchange of knowledge and project discussions in January 1999. The group consisted of 13 key administrative and operational staff within air and water protection departments in Heilongjiang (6 persons) and Yantai (7 persons). The visit started on January 18, and was accomplished within two weeks. The group followed an intensive training programme for the ENSIS system and also had the possibility to visit the State Pollution Control Authority (SFT) and NORAD. These visits gave basis for a fruitful exchange of knowledge between the two countries.

#### *Abatement strategy*

During discussions between the HEPB, HEMCS and NIVA, it was suggested to single out one sub-catchment as a case catchment in the Songhua River catchment. After further consideration, the Mudanjiang catchment appeared to be appropriate for the purpose of the co-operation project. This selection means that the sub-project "Abatement strategy" will focus on the Mudanjiang catchment only, but that the procedures applied are valid for any other

catchment in the Songhua River catchment. The Mudanjiang Environmental Protection Bureau (MEPB) and the river catchment were visited in April and in September 1999. The visits showed the importance of working in close contact with people genuinely concerned by the environmental problems of the area where they live.

*Data collection and input to the ENSIS system*

Water quality data from the whole Songhuajiang catchment from 1997, 1998, and 1999 were converted for import from Foxpro to the ENSIS system. For the last 12 years 19970 data sets are converted, and 13933 imported to ENSIS. The necessary data for preparing an abatement strategy for the Mudanjiang catchment have been delivered from the local authorities in Mudanjiang (MEPB) to the Norwegian project partners.

*Installation of Water Monitoring equipment*

Within the project, monitoring instruments have been delivered both for continuous measurements at river sites and for laboratory work at the analytical laboratory at HEMCS in Harbin. The installation of the water quality monitoring instruments at the river sites took place during April 12 - 23 1999. Installation was completed at Harbin Waterplant, Qiqihar Waterplant, Mudanjiang Waterplant and Jiamusi Powerplant. At the same time more specific training of the local personnel was undertaken. In the laboratory at HEMCS an AAS (atomic absorption spectrophotometer) and an ion chromatograph, have been installed. The instruments are performing well. They are used respectively for analysis of Cu, Pb, Cd, Mn, Cl, F and SO<sub>4</sub>.

*Project Workshop and ENSIS installation April 1999*

During a mission to Harbin and Mudanjiang in April 1999, a workshop was held in Harbin 19 – 23 April, covering the following issues: Project management, Data collection, Training and ENSIS installation and Abatement strategy planning for Mudandjiang catchment. A Summary report from the Workshop is included in the Consolidated Summary Report of NIVAs mission to Harbin in April 1999 (NIVA Report 4164-2000).

*Project Meeting in Mudanjiang*

In the period 31 August – 10 September 1999 a project meeting was held in Mudanjiang. The main topic for the visit was the case study on abatement strategy for the Mudanjiang catchment and drafting the report for the area. (See NIVAs Consolidated Mission reports from April and September – November.)

*Workshop in Harbin in October for data input and ENSIS training*

During a workshop in Harbin 7 – 14 October, emphasis was set on training and data input for the ENSIS system for Heilongjiang Province. The workshop was accomplished according to plan. The results and conclusions from the workshop are described in more detail in the Consolidated Mission reports from September – November 1999.

*Project Meeting in Harbin in November*

During November 1 – 4 the last project meeting in 1999 was held in Harbin. Participants were Mr. Guo Yuan, Mr. Chen Yong, Ms Ming Xiannan from HEPB, Ms Chen Aifeng from HEMCS, Mr Torstein Skancke and Mr Geir Bakke Nielsen from Norgit, and Ms Bente M. Wathne from NIVA. Some of the main themes were in addition to administrative matters, project status and plans for 2000, the project extensions and further co-operation. A more detailed report from the project meeting is given in the Consolidated Mission reports from September – November 1999.

#### *Laboratory Inter-comparison*

A laboratory inter-comparison was organised in 1998 between NIVA and the co-operative laboratories in Harbin and Yantai, Shandong Province. The results indicated that it would be very important to carry out a more comprehensive inter-comparison during 1999. The intercomparison was carried out during November and December and the results will be reported in 2000.

#### *Information technology*

The complete version of "ENSIS 2.02" was installed at HECMS in Harbin in April 1999. The ADACS (Automatic transmission of data) system developed to handle automatic transfer of water quality data from the monitoring sites to the central ENSIS database in Harbin, gave in 1999 some problems concerning communication with the loggers and measurement position. At the end of 1999, there were still some problems with the transmission from the loggers, but a new installation in early 2000 is promised to solve the problems.

NORGIT visited Harbin in March, April and November 1999. At these occasions training in the use of "ENSIS" and "ADACS" were carried out. NORGIT has also trained Chinese personnel in the use of "ORACLE" (database) and "ArcView" (GIS/map-management). The first version or an update of important ENSIS documentation was November delivered in 1999.

#### *Laboratory Inter-comparison*

A laboratory inter-comparison was organised in 1998 between NIVA and the co-operative laboratories in Harbin and Yantai, Shandong Province. The inter comparison results indicate that it would be very important to carry out a more comprehensive inter-comparison during 1999, which would encompass all major components.

#### **Project Cost in 1999**

Phase 2 (planned for April 1997–December 1998) have run from April 1997 until June 1999 due to the delay in the project work. Phase 3 will run from July 1999 until June 2000. The budget for 1999 for the Norwegian experts was **NOK 1.914.664**, while the actual project costs and therefore the total remuneration should be **NOK 1.722.240**. The underspent will be transferred to 2000 and has been included in the budget.

#### **Project Budget for 1999**

The year 2000 will be the finalising year for the project, covering the last part of phase 3 and the follow up activities. The total project budget for 2000 for CHN 017 for the Norwegian side is **NOK 1 152 041**.

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## 1. Background

The project "Surveillance of the Water Quality in the Songhua River System in Heilongjiang Province, P.R. of China" was launched in November 1996, when an agreement was signed between the Norwegian Agency for Development Co-operation (NORAD) and The Chinese State Science and Technology Commission (SSTC). SSTC is now the Ministry of Science and Technology (MOST). The year 1999 was the third full working year of the project, and the project will terminate in June 2000.

The executive institutions of the project are:

- from China, the Heilongjiang Environmental Protection Bureau (H/EPB) and the Heilongjiang Environmental Monitoring Central Station (HEMCS).
- from Norway, the co-operative institutions the Norwegian Institute for Water Research (NIVA) and the NORGIT Centre.

This document provides input information to the Annual Report to be prepared by the Chinese partners of the project.

## 2. Project work 1999

### 2.1 Main events

Project related work has been carried out both in China and Norway throughout 1999, and the following main events have taken place:

- January 1999, Training in Oslo for Chinese experts
- February -April, 1999, Adaptation and testing of the Chinese version of ENSIS in Norway
- March 1999, ENSIS installation on PC for training in Harbin
- April 1999, Workshop in Harbin/Mudanjiang, including installation of the first part of the Chinese version of ENSIS
- April 1999, Installation of, and training on water quality instruments
- May - October 1999, Modification of ENSIS
- September 1999, Mission to Mudanjiang for case study on abatement strategy
- October 1999, Workshop on data input an training in Harbin
- November 1999, Project meeting in Harbin

### 2.2 Administration

A general feature as regards this project is that the administration activities have been considerably more time consuming than originally predicted. This is due to project reorganising and budget revisions e.g. removal of the air monitoring part of the project. An addendum to the contract between SSTC and NORAD was signed in September 1997. This addendum approved i.a. the final project

budgets, listing also in more detail the allocations for 1997 and 1998. The Chinese side still had some questions to the 1998 and 1999 budgets to be solved based on the financial details from the revised budget. Some financial details were still discussed through 1999, but an agreement on these matters is expected to find accept by MOST, so that the remaining budget for the project can be concluded.

A 6 months delay in the project work in 1997 affected the further time schedule of the project, i.e. the agreed original work plan was revised for the remaining project work. The project will terminate in June 2000 according to the revised plan.

## 2.3 Training in Norway

A joint group from HEPB/HEMCS and the equivalent from Yantai Environmental Protection Bureau and Monitoring Centre visited NIVA and the Norwegian Institute for Air Research (NILU) for training, exchange of knowledge and project discussions in January 1999. The group consisted of 13 key administrative and operational staff within air and water protection departments in Heilongjiang (water) and Yantai (air and water). The visit started on January 18, and was accomplished within two weeks.

From "Surveillance of Water Quality in the Songhua River, Heilongjiang Province, China - Project CHN 017" the following experts were visiting:

1. Mrs Lin Shujie      Senior engineer, Supervision and Monitoring Division of Heilongjiang Provincial Environmental Protection Bureau (H/EPB)
2. Mrs Zhang Tieying      Senior engineer, Environmental Information Center of H/EPB
3. Mr Dong Xianfeng      Project officer, Foreign Cooperation Division of H/EPB
4. Mrs Chen Aifeng      Senior engineer/vice Director of Heilongjiang Environmental Central Monitoring Station (HEMCS)
5. Mr Chen Jiahou      Senior engineer, Heilongjiang Environmental Central Monitoring Station (HEMCS)
6. Mr. Li Jiming      Senior engineer, Heilongjiang Environmental Central Monitoring Station (HEMCS)

The training comprised both theoretical lessons and practical exercises. The most important topics covered during the visit were:

- ENSIS terminology and the user manual
- Definitions in ENSIS and search criteria
- Geographical Information System (GIS) in ENSIS
- Basic concepts of the monitoring database
- Monitoring stations and Data series
- Quality assurance and Graphics
- Statistics used for both water and air
- Demonstration of ADACS
- Abatement strategy and planning

The programme was condensed, and to some extent it was necessary to divide the group in two and work in parallel for air and water themes. The group followed an intensive training programme for the

ENSIS system and also had the possibility to visit the State Pollution Control Authority (SFT) and NORAD. These visits gave basis for a fruitful exchange of knowledge between the two countries.

The full programme for the visit is given in Annex A.

## **2.4 Abatement strategy**

During discussions between the HEPB, HEMCS and NIVA, it was suggested to single out one sub-catchment as a case catchment in the Songhua River catchment. After further consideration, the Mudanjiang catchment appeared to be appropriate for the purpose of the co-operation project. The criteria used in the selection process were, *inter alia*, the presence of:

- A certain number of industrial activities (small and large plants)
- Agricultural activities
- Planned construction of wastewater plants
- Existing chemical and hydrological monitoring stations
- A number of user interests linked to the river
- Varying land-cover
- Appropriate catchment size

Furthermore, the Mudanjiang catchment includes a natural lake and one artificial reservoir and has local expertise about the catchment, to facilitate the work of NIVA.

The selection of the Mudanjiang means that the sub-project “Abatement strategy” will focus on this catchment only, but also that the procedures applied are valid for any other catchment in the Songhua River catchment.

Mr Stig A. Borgvang visited the Mudanjiang Environmental Protection Bureau (MEPB) for a first preliminary study of the river catchment in April 1999. In September 1999 and both Mr Stig A. Borgvang and Mr Jon Lasse Bratli visited in Mudanjiang. (See NIVAs Consolidated Mission reports from April and September – November).

## **2.5 Data collection and input to the ENSIS system**

### **2.5.1 Data for the Songhua River Catchment**

All monitoring data from lakes and rivers have been exported from the FoxPro database and converted into Excel files as the first step of the conversion process to ENSIS. The files for the individual years contained all stations and all parameters for the year in question. Data from 1997, 1998, and 1999 in all 8404 data sets were converted, and of them 6784 data sets have already been imported from Foxpro. For the last 12 years 19970 data sets are converted, and 13933 imported to ENSIS.

### **2.5.2 Data for abatement strategy for the Mudanjiang catchment**

In addition to monitoring results from the water quality and biology surveillance of the Mudanjiang catchment, information on industrial activities and municipal waste-water are necessary to prepare the abatement strategy. The necessary data for an abatement strategy for the Mudanjiang catchment have

been delivered from the local authorities in the Mudanjiang Environmental Protection Bureau (MEPB) to the Norwegian project partners.

## **2.6 Installation of Water Monitoring equipment**

Within the project, monitoring instruments have been delivered both for continuous measurements at river sites and for laboratory work at the analytical laboratory at HECMS in Harbin. The possibility for the Chinese project partners to purchase laboratory instruments came through the budget revisions after removal of the original air part of the project.

### **2.6.1 Installation of instruments at the monitoring stations**

Due to delays in the ordering process, the monitoring instruments were only delivered lately in 1998. At that time installation was not possible due to climatic factors, so the installation therefore took place during April 12 - 23 1999.

The instrument installation were carried out by Mr. Arne Veidel and Mr. Morten Willbergh from NIVA, with assistance from HEPB and the Chinese local personnel at the monitoring sites in Harbin, Qiqihar, Mudanjaing, and Jiamusi. The installation process started at Harbin Waterplant, and all the personnel from the other monitoring sites were then present for training purposes. They later assisted in the same process at their on site. Installation was completed at Harbin Waterplant, Qiqihar Waterplant, Mudanjaing Waterplant and Jiamusi Powerplant. At the same time more specific training of the local personnel was undertaken.

The mobile monitoring station has not yet been put together, but all the instruments are delivered. Configuration and installation will be carried out after a running-in period with the instruments. The installation process is described in detail in the Consolidated Summary Report of NIVAs mission to Harbin in April 1999 (NIVA Report 4164-2000).

### **2.6.2 Installation of instruments for analytical labs**

AAS (atomic absorption spectrophotometer) Hitachi Z-500 and ion chromatograph Shimadzi HIL-14A, have been installed in the lab at HEMCS. The instruments are performing well. They are used respectively for analysis of Cu, Pb, Cd, Mn, Cl, F and SO<sub>4</sub>.

## **2.7 Project Workshop and ENSIS installation April 1999**

During a mission to Harbin and Mudanjiang in April 1999, a workshop was held in Harbin 19 – 23 April, covering the following issues:

- Project management
  1. Annual Report discussions
  2. Project extensions and further co-operation
- Data collection
- Training and ENSIS installation
- Abatement strategy planning for Mudandjiang catchment

A visit to Mudanjiang was included as the first preliminary study of the river catchment.

Participants from Heilongjiang Environmental Protection Bureau and Monitoring Central Station were Mr. Li Weixiang, Mr. Guo Yuan, Mr., Ms. Chen Aifeng, Mr. Chen Jiahou, Mr. Dong Xianfeng and Ms. Wu Yuehui. Mr Chen Yong, Mr Li Jiming, Mr Chen Xiaobin, Mr Jiang Bo, Ms Qu Moli, Ms Li Fen, and Mr Zhao Wenkui.

From NIVA participated Ms Bente Wathne, Mr Stig A. Borgvang, Ms Kjersti Dagestad and Mr Tor Haakon Bakken, and from NORGIT Mr Torstein Skancke and Mr Audun Grotterød.

A Summary report from the Workshop is included in the Consolidated Summary Report of NIVAs mission to Harbin in April 1999 (NIVA Report 4164-2000).

## **2.8 Project Meeting in Mudanjiang**

In the period 31 August – 10 September 1999 a project meeting was held in Mudanjiang, when both Mr Stig A. Borgvang and Mr Jon Lasse Bratli visited the catchment. The main topic for the visit was the case study on abatement strategy for the Mudanjiang catchment and drafting the report for the area. Participants from Mudanjiang Monitoring centre were Mr Sun Zi Meng, Mr Ye Dan, Mr Niu Xian Chun, and Ms Yu Shi Hong. From HEPB Ms Qu Mo Li, participated. (See NIVAs Consolidated Mission reports from April and September – November). The visits showed the importance of working in close contact with people genuinely concerned by the environmental problems of the area where they live.

## **2.9 Workshop in Harbin in October for data input and ENSIS training**

During a workshop in Harbin 7 – 14 October, emphasis was set on training and data input for the ENSIS system for Heilongjiang Province. Ms Kjersti Dagestad and Mr Tor Haakon Bakken from NIVA visited ,and participants from HEPB/HEMCS were Ms Chen Aifeng, Ms Li jiming, Ms Qu Mo li, Ms Li Fen, Mr Jiang Bo, Mr Chen Xiao Bin, Ms Yu shi hong, Ms Du Bing yi. The goals for the workshop were to:

- Synchronise the local database with the most recent version of the ENSIS database
- Install an updated version of the ENSIS application
- Discuss questions and problems encountered in the period since the previous training session
- Export all the monitoring data within the Songhua River Catchment from FoxPro to Excel, and convert the data to ENSIS format
- Build a complete monitoring database by importing converted data to ENSIS, and enter other necessary data for the system
- Discuss pollution source data and how to proceed within the current project.

The workshop was accomplished according to plan. The results and conclusions from the workshop are described in more detail in the Consolidated Mission reports from September – November 1999.

## **2.10 Project Meeting in Harbin in November**

During November 1 – 4 the last project meeting in 1999 was held in Harbin. Participants were Mr. Guo Yuan, Mr. Chen Yong, Ms Ming Xiannan from HEPB, Ms Chen Aifeng from HEMCS, Mr Torstein

Skandcke and Mr Geir Bakke Nielsen from Norgit, and Ms Bente M. Wathne from NIVA. The main themes were:

- administrative matters,
- project status, and plans for 2000
- the water monitoring stations and their management,
- plans for the annual report
- project extensions and further co-operation
- intercalibration activities
- support and service for the ENSIS system

A more detailed report from the project meeting is given in the Consolidated Mission reports from September – November 1999.

## **2.11 Laboratory Inter-comparison**

A laboratory inter-comparison was organised in 1998 between NIVA and the co-operative laboratories in and Harbin and Yantai, Shandong Province (CHN014). The results indicated that it would be very important to carry out a more comprehensive inter-comparison during 1999, which would encompass all major components. On this basis it was decided to carry out a more comprehensive inter-comparison during 1999 including all major components. The intercomparison was carried out during November and December and the results will be reported in 2000.

## **2.12 Information technology**

### **2.12.1 Installation of ENSIS**

The installation of ENSIS was planned for March 1999, but due to delay in the transport of the server, the installation was only possible on the computer at the time of NORGIT's visit in March 1999. The complete version of "ENSIS 2.02" was therefore installed at HECMS in Harbin in April 1999. This includes a new version of the "User Database Administrative Tool". During 1999 NORGIT also developed "ENSIS" to handle different languages, i.e. both English and Chinese. The first version of "ENSIS" in Chinese was sent to China for testing in December 1999.

### **2.12.2 Automatic transmission of data - ADACS**

The ADACS system is developed to handle automatic transfer of water quality data from the monitoring sites to the central ENSIS database in Harbin. During 1999 there have been some problems with "ADACS" concerning communication with the loggers and measurement position. At the end of 1999, there were still some problems with the transmission from the loggers, but a new installation in early 2000 is promised to solve the problems. Also new functionality in "ENSIS" to handle the problems concerning measurement position was specified in 1999, and will be developed/installed in the first half of 2000.

### **2.12.3 Maps**

NORGIT has prepared some new detailed maps received from Harbin, and some map-themes were installed in Harbin during the Workshop in October/November 1999.

### **2.12.4 Training**

NORGIT visited Harbin in March, April and November 1999. At these occasions training in the use of "ENSIS" and "ADACS" were carried out. NORGIT has also trained Chinese personnel in the use of "ORACLE" (database) and "ArcView" (GIS/map-management). Map-management is however not a part of the project.

### **2.12.5 Documentation**

In November 1999 NORGIT delivered an update or first version of the following documentation:

- "ADACS"
- "User Database Application for Administrator"
- The part "File" (includes Import/Export) of the "ENSIS user manual"
- "System management"
- "Report Generator".



### **3. Revised Summary Work Plan**

The original project plan is described in detail in the Project Proposal: "Surveillance of Water Quality in the Songhuajiang River System in the Heilongjiang Province, P.R. of China", dated January 1996. Based on the plans for the different tasks on surveillance of water quality and development of the information technology, the project work is delayed from six months to almost two years. The installation of monitoring instruments for water quality is almost two years delayed, but intensive work during spring 1999 was taken on to minimise the potential problems due to this delay. According to the revised project plan, the project will terminate in June 2000.

#### **3.1 Phase 1 (November 1996–March 1997)**

Phase 1 has been carried out according to plans. The following tasks were completed during the first phase of the project:

1. Project start-up seminar in Harbin
2. Detailed planning and preparations for the water monitoring and surveillance programme
3. Planning of the discharge data base, the basis of the pre-feasibility study
4. Start of discharge data inventory
5. Collection of other relevant available information on water quality
6. Evaluate existing monitoring network
7. Institutional assessment, man power, infrastructures, equipment
8. Evaluation of laboratory equipment
9. Data model adaptation

All activities were completed as planned during phase 1, and by the end of the first phase, preparations for phase 2 were performed.

#### **3.2 Phase 2 (April 1997–May 1999)**

Phase 2 was planned as a continuation of activities from phase 1, with the addition of new activities as shown below. Phase 2 project work was delayed from six months to almost two years compared to the original plan. The following tasks were completed during the project phase 2:

1. Start sampling and continuous monitoring at the river stations
  - a. system for automatic sampling, analysis and data handling
  - b. system for manual sampling, analysis and data handling
  - c. quality control
2. Installation of 1 server and 2 workstations
3. Make the telecommunication operative
4. First data for the river model for the Songhuajiang River system systematised and main discharge points located
5. Visit of the Chinese delegation in Norway (4 key operators and 2 key administrative staff)
6. Local training in:

- a. operation and maintenance of monitoring instruments
  - b. maintenance of computer system
  - c. system operation
7. Evaluation of the existing monitoring system, considering a possible need for extensions
  8. Abatement strategy planning, 1st step

A Workshop for training on the first version of the ENSIS system was held in Oslo in January 1999.

In April 1999, the water quality monitoring instruments were installed at the four river sites along Songhuajiang River.

The first complete version of the ENSIS system was installed in Harbin, Heilongjiang in April 1999, at the same time as a workshop was organised to finalise phase 2 of the project.

### **3.3 Phase 3 (June 1999–June 2000)**

Phase three contains mainly improvements and finalisation of the tasks described in phase 2. A complete version of the integrated ENSIS system, containing measurements, quality control, model, statistics and GIS presentations will be installed and adapted to the local environment. A final training will be performed in Harbin in the year 2000 to ensure that the system is fully understood and learned by local personnel.

The following tasks are preliminary listed for phase 3:

1. Make the model operational
2. Installation of the complete ENSIS in the Heilongjiang Province
3. Further training of the staff in HEPB/HECMS in operating the ENSIS system
4. Finalise the abatement strategy report for Mudanjiang catchment as a case study on abatement strategy for the Songhua River catchment
5. Finalise the plan for extensions and new project activities for the water monitoring and surveillance

In addition to work performed by ENSIS personnel in Heilongjiang, a final workshop will be organised containing:

- Presentation of the ENSIS surveillance system
- Discussion on needs for local personnel for further operating and maintenance of the monitoring and data system
- Discussion of further needs for collaboration
- Preparations of the content of the final report, distribution of responsibilities

It was agreed that a draft of the Final report should be discussed during the Final Workshop in May-June 2000, and then finalised after the Workshop. The report should be sent to NORAD no later than three months after the final workshop.

### 3.4 Activity plan for 2000

The 2000 activities are summarised in the table below.

<b>Activity</b>	<b>Date</b>
Delivery of the input to the Annual Report from NIVA	End of February 2000
Training in Harbin, (provided by NORGIT)	February/March 2000
Final abatement strategy report	End of February 2000
Annual Report from HEPB to MOST	End of March
Monitoring stations, follow up	January-June 2000
Installation of the water model and the complete Chinese version of ENSIS	May 2000
Final Workshop <ul style="list-style-type: none"> <li>• Dissemination of results</li> <li>• Presentation of the technical ENSIS system</li> <li>• Presentation of how to use the ENSIS system</li> <li>• Plans for extensions of the water monitoring and surveillance programme</li> <li>• Presentation of the abatement strategy</li> </ul>	May/June 2000
Final report – draft	June 2000
Final report to NORAD	September 2000

### 3.5 Revised Summary Time Schedule

The plans for the total project will then be as given in the following table.

.Phases	1996	1997				1998				1999				2000			
	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Phase 1</b>																	
Workshop Harbin	□	□															
Project planning																	
Pollution review and screening																	
Discharge inventory																	
Network, data handling																	
Evaluation, monitoring equipm.																	
Phase 1 reports			□														
<b>Phase 2</b>																	
Workshops Harbin					□	□				□							
Data collection and review																	
ENSIS, first version																	
Punching and import of data																	
Installation water monitors																	
Abatement strategy																	
River model																	
Training ENSIS, Norway																	
Installation of first ENSIS																	
Phase 2, reports						□					□						
<b>Phase 3</b>																	
Installation, final ENSIS version																	
Testing, adapt ENSIS																	
Workshop in Harbin																	
Monitoring stations follow up																	
Revised monitoring programme																	
Final workshop																	
Final project report																	

## 4. Project costs and budget

### 4.1 General overview

The total budget for the project, which also was the budget for the Norwegian side, was in the original Project Plan **NOK 11.590.007**. (See Annex II in the Agreement between NORAD and SSTC, signed November 8 1996). The project budget was divided into three phases:

Project Phases	Period	Costs
Phase 1	(November 1996 – March 1997)	NOK 1.500.000.
Phase 2	(April 1997 – September 1998)	NOK 8.244.007.
Phase 3	(October 1998 – September 1999).	NOK 1.551.000
Project expenses		NOK 295.000
<b>Total</b>		<b>NOK 11.590.007</b>

Phase 1 was carried through according to plans, and the costs spent were **NOK 1.500.102**. According to information from NORAD, NOK 1.500.000 was transferred to MOST during phase 1. Of this amount **NOK 778.105** was remunerated from China to the Norwegian experts, leaving **NOK 721.997** by the Chinese side. The rest of the amount to cover the Norwegian expenses in phase 1 was remunerated directly from NORAD, as there were changes of the financial procedures and handling routines for these projects.

After the Annual Meeting between MOST (MSTC/SSTC) and NORAD in 1997 the Project was changed, as the air part was removed from the plans. This change was followed by discussions of the belonging budget allocations.

In 1997 it was agreed between NORAD and MOST that the Chinese side should purchase data equipment and water monitors for the project. It was later also agreed that installation of the ENSIS system should be performed in Norway due to practical reasons. An agreed budget for phase 2 showing in detail the allocations between the HEPB and NIVA was signed in June 1997 (see NIVA report SNO 4018-99). After elimination of a fee to SSTC of NOK 250.000, not acceptable for NORAD, this budget includes an allocation of NOK 4.829.800 to the Chinese side and NOK 3.132.000 to the Norwegian side within phase 2. Reallocation of NOK 250.000 with NOK 200.000 to the Chinese side and NOK 50.000 to the Norwegian side gives a total budget of **NOK 5.029.800** to the Chinese side and **NOK 3.182.000** to the Norwegian side for phase 2 of the project. Of this allocation, a total amount of **NOK 4.600.000** was transferred directly to China in 1997. There was no transfer of money to Chinese side in 1998 or 1999.

From the phase 3 budget, **NOK 60.000** was reallocated from the original Norwegian budget over to the Chinese side to cover the expenses of the final workshop. This was agreed as part of the budget revisions after removal of the air part of the project in 1997, and part of the agreement for the budget signed for phase 2 in June 1997.

There has been a long history of negotiations and changes of financial procedures and handling routines during the running of this project, which have made financial control difficult for all parties. During a project evaluation started by NORAD in 1999 it was revealed that a too large proportion of the project funds had been transferred to MOST. A letter sent by NORAD on financial matters

explained this fact and asked that an additional amount of **NOK 191.000** should be made available for NIVA from the money transferred to MOST.

The Chinese project partners have stated that MOST had not yet agreed to the overall budget referred to in NORADs letter, and the transferred money has been spent on project related issues, with the understanding that the amount was correct. It appeared that it is very difficult, at this stage, to reallocate the money.

Following the budget signed in 1997, the total remuneration to the Norwegian experts in 1999 should be **NOK 1.914.664** as explained in more detail in Input to the Annual Report for 1998 (NIVA SNO4016-99).

## 4.2 Project Cost in 1999

Phase 2 (planned for April 1997–December 1998) have run from April 1997 until June 1999 due to the delay in the project work. Phase 3 will run from July 1999 until June 2000.

The budget for 1999 for the Norwegian experts was **NOK 1.914.664**, while the actual project costs and therefore the total remuneration should be **NOK 1.722.240** as shown below:

**Table 1. The Norwegian budget and actual project costs for 1999.**  
All amounts are given in NOK.

Activity	<i>Budget for 1999</i>		<i>Costs for 1999</i>	
<b>Administration</b>	<b>528 057</b>		<b>580 499</b>	
Consulting services		284 072		338 592
Travelling expenses		243 985		241 907
<b>Intercalibration</b>	<b>20 000</b>		<b>4 550</b>	
<b>River Water Quality</b>	<b>28 079</b>		<b>27 000</b>	
<b>Inventory</b>	<b>40 591</b>		<b>31 950</b>	
<b>Monitoring and training</b>	<b>423 820</b>		<b>423 978</b>	
Consulting services and training				183 813
Transport of instruments				3 278
Training in the ENSIS system				236 887
<b>River Modeling</b>	<b>218 050</b>			
<b>Abatement strategy</b>	<b>321 974</b>		<b>344 770</b>	
<b>Software and IT rental fee</b>	<b>87 080</b>		<b>87 080</b>	
<b>Data management</b>	<b>40 000</b>		<b>36 750</b>	
<b>Installation</b>	<b>50 000</b>		<b>50 000</b>	
<b>Configuration and test</b>	<b>30 000</b>		<b>36 750</b>	
<b>IT consultancy</b>	<b>127 013</b>		<b>135 663</b>	
<b>Total</b>	<b>1 914 664</b>		<b>1 722 240</b>	

The intercalibration work started in 1999 and will be reported in 2000. The river model is somewhat delayed compared to the plan. The underspent will be transferred to 2000 and has been taken into the budget as it is shown below.

### 4.3 Project Budget for 2000

The year 2000 will be the finalising year for the project, covering the last part of phase 3 and the follow up activities.

The total project budget for 2000 for CHN 017 for the Norwegian side is **NOK 1 152 041**, and the details of the budget are shown in table 2.

**Table 2. Total project budget for Norwegian side for 2000**  
All amount are given in NOK

Task	Budget	
	2000	
<b>Administration</b>	<b>338 245</b>	
Consulting services		169 390
Travelling expenses		168 855
<b>Intercalibration</b>	<b>15 450</b>	
<b>Final report</b>	<b>65 000</b>	
<b>Workshop</b>	<b>120 000</b>	
<b>Monitoring</b>	<b>59 079</b>	
Consulting services and training		59 079
<b>River Modelling</b>	<b>318 050</b>	
<b>Abatement strategy</b>	<b>2 204</b>	
<b>ENSIS training/follow up</b>	<b>205 763</b>	
<b>Installation</b>	<b>50 000</b>	
<b>Configuration and test</b>	<b>28 250</b>	
<b>Total</b>	<b>1 152 041</b>	

From the phase 3 budget, **NOK 60.000** was reallocated from the original Norwegian budget over to the Chinese side to cover the expenses of the final workshop.

## 5. Reports from the project produced by NIVA.

- Report SNO 3523-96. Surveillance of Water Quality in the Songhua River System in Heilongjiang Province – Pre-feasibility study – 1995. Travel report from, Heilongjiang Province, China, October/November 1995.
- Project Proposal. Surveillance of Water Quality in the Songhua River System in Heilongjiang Province, P.R. of China. January 1996.
- Report SNO 3615-97 Workshop Report from Surveillance of Water Quality in the Songhua River System in Heilongjiang Province, P.R. of China, Harbin, Heilongjiang 17 - 22 November 1996
- Report SNO 3641-97 Summary Report. Surveillance of Water Quality in the Songhua River System in Heilongjiang Province, P.R. of China, Harbin, Heilongjiang 26 November - 3 March 1997
- Report SNO 3805-98 Status Report 1997. Surveillance of Water Quality in the Songhua River System in Heilongjiang Province, P.R. of China.
- Report SNO 4018-99 Surveillance of Water Quality in the Songhua River System in Heilongjiang Province P.R. of China. CHN 017. Input to the Annual Report 1998.
- Report SNO 4164-2000 Surveillance of Water Quality in the Songhua River System in Heilongjiang Province P.R. of China. CHN 017. Consolidated Summary Report of NIVA's mission to Harbin April 1999.
- Report SNO 4205-2000 Surveillance of Water Quality in the Songhua River System in Heilongjiang Province P.R. of China. CHN 017. Consolidated Summary Report of NIVA's missions to Mudandjiang and Harbin September - November 1999.
- Report SNO 4206-2000 Surveillance of Water Quality in the Songhua River System in Heilongjiang Province P.R. of China. CHN 017. Input to the Annual Report 1999.



## Appendix A.

### Visit from Heilongjiang and Yantai, China

#### Programme Overview

- Monday 18 January,** Arrival in Oslo
- Tuesday 19 January,** Joint Session at NILU,  
Welcome and Introduction to ENSIS  
*Dinner at Frognerseteren Restaurant hosted by NIVA*
- Wednesday 20 January,** Joint Session at NILU, The Measurement Database & Important Concepts
- Thursday 21 January,** Joint session at NILU and NIVA, Dataset & visits to NILU and NIVA
- Friday 22 January,** Separat sessions at NILU  
1. Air - Input Data Specification  
2. Water QUIS - Geography and Pollution Sources  
3. ENSIS IT-Maintenance  
*Dinner hosted by NILU*
- Saturday 23 January,** Shopping and Sightseeing
- Sunday 24 January,** Sightseeing in Oslo
- Monday 25 January,** Joint session, Visit to authorities SFT and NORAD  
*Dinner hosted by NORGIT*
- Tuesday 26 January,** Separat sessions at NILU and NIVA  
1. Air - The Emission Model & The Wind Field Model  
2. Water - Abatement strategy and Modelling
- Wednesday 27 January,** Departure from Oslo

## Detailed Day to Day Programme

### Monday 18 January, Arrival in Oslo

### Tuesday 19 January, Joint Session (at NILU), Welcome and Introduction to ENSIS

09.00-09.30	Welcome address, Øystein Hov, NILU
09.30-09.45	Program for the stay and practical arrangements, Bente Wathne, NIVA
09.45-10.30	Status for the ENSIS project and plans for installation, Bente Wathne, NIVA and Trond Bøhler NILU
10.30-10.40	Break
10.40-11.10	Overview of the ENSIS application, by Tor Haakon Bakken NIVA
11.10-11.40	ENSIS terminology and the user manual, by Tor Haakon Bakken, NIVA
11.40-12.00	Definitions in ENSIS and search criteria, by Tor Haakon Bakken, NIVA
12.00-13.00	Lunch
13.00-14.20	Geographical Information System (GIS) in ENSIS, by Tor Haakon Bakken, NIVA
14.20-14.30	Break
14.30-15.30	Basic concepts of the monitoring database, by Kjersti Dagestad, NIVA
15.30-16.00	Monitoring stations, by Kjersti Dagestad, NIVA
16.00	Close

**EVENING PROGRAM:** Welcome dinner hosted by NIVA

### Wednesday 20 January, Joint Session at NILU, The Measurement Database & Important Concepts

09.00-09.10	Introduction
09.10-10.30	Data series and Monitoring data, by Kjersti Dagestad NIVA
10.30-10.40	Break
10.40-11.00	Data series and Monitoring data, by Kjersti Dagestad NIVA
11.00-12.00	Quality assurance and Graphics, by Kjersti Dagestad NIVA and Mona Johnsrud, NILU
12.00-13.00	Lunch
13.00-14.30	Statistics used for both water and air, by Mona Johnsrud, NILU
14.30-14.45	Break
14.45-15.30	Important concepts used for data, by Rune Ødegård, NILU ( <i>val.period, time variation, units, unit types etc</i> )
15.30-16.00	Brief demonstration of ADACS, by Richard Rostad, NORGIT
16.00	Close

**EVENING PROGRAM:** No program arranged by the projects.

### **Thursday 21 January, Joint session at NILU and NIVA, Dataset & visits**

09.00-09.10	Introduction (joint session)
09.10-10.30	Datasets (point, line, region and field), Rune Ødegård, NILU (joint session)
10.30-10.40	Break
10.10-12.00	Guide and laboratory visit at NILU
12.00-13.00	Lunch
13.00-13.30	Transport to NIVA
13.30-15.0	Guide and laboratory visit at NIVA
15.00-16.00	Intercalibration, Stig Borgvang and Håvard Hovind, NIVA

#### **EVENING PROGRAM:**

### **Friday 22 January, NILU session (at NILU), Input Data Specification Meeting & Input to the Emission Model**

09.00-12.00	Data requirement and project planning, by Trond Bøhler and Rune Ødegård
12.00-13.00	Lunch
13.00-14.00	Input to the Emission Model, region distributed data, by Rune Ødegård
14.00-15.00	Input to the Emission Model, the Industry module, by Rune Ødegård
15.00-16.00	Input to the Emission Model, the Traffic module, by Rune Ødegård
16.00	Close

EVENING PROGRAM: NORGIT will host dinner in Oslo

### **Friday 22 January, NIVA session (at NILU), Water QUIS- Geography and , Pollution Sources**

09.00-09.30	Introduction to data handling in ENSIS, Tor Haakon Bakken NIVA
09.30-10.00	Introduction to catchment, rivers and lakes, Tor Haakon Bakken and Stig Borgvang, NIVA
10.00-11.00	Construction of Catchment and catchment information, by Tor Haakon Bakken and Stig Borgvang, NIVA
11.00-11.10	Break

11.10-12.00	Lakes and Lake information, by Tor Haakon Bakken and Stig Borgvang, NIVA
12.00-13.00	Lunch
13.00-14.0	Rivers and river information, by Tor Haakon Bakken and Stig Borgvang, NIVA
14.00-16.00	Pollution Sources in ENSIS
14.50-15.00	Break
16.00	Close

EVENING PROGRAM: NORGIT will host dinner in Oslo

### **Friday 22 January, NORGIT session (at NILU), ENSIS IT-Maintenance**

09.00-09.30	Introduction to ENSIS from IT-perspective, by Audun Grotterød, Norgit
09.30-12.00	How to handle the day-to day IT activities, by Audun Grotterød, Norgit
12.00-13.00	Lunch

EVENING PROGRAM: NORGIT will host dinner in Oslo

### **Saturday 23 January, Visit to Lillehammer**

### **Sunday 24 January, Sightseeing in Oslo**

### **Monday 25 January, Joint session, Visit to authorities (SFT and NORAD)**

9 -11	Meeting with NORAD
11:30	Arrival SFT
11:30 - 12:30	Lunch
12:30 - 14:30	Presentation of SFT
14:30 - 16:00	Shopping in Oslo

**Evening Program: NILU will host the dinner**

**Tuesday 26 January, NILU session, The Emission Model, The Wind Field Model, The Dispersion Model & The Exposure Model**

09.00-09.10	Introduction
09.10-10.30	The Emission Model, by Rune Ødegård
10.30-10.40	Break
10.40-12.00	The Wind Field Model, by Rune Ødegård
12.00-13.00	Lunch
13.00-14.30	The Dispersion Model, by Rune Ødegård
14.30-14.40	Break
14.40-16.00	The Population Exposure Model, by Rune Ødegård
16.00	Close

EVENING PROGRAM....

**Tuesday 26 January, NIVA session (at NIVA), Abatement strategy and Modelling**

09.00-09.10	Introduction
09.10-10.30	Abatement Strategy, Stig Borgvang NIVA
10.30-10.40	Break
10.40-12.00	Discussion of model to be implemented in ENSIS, Nils Roar Sælthun NIVA
12.00-13.0	Lunch
13.00-16.00	Data Collection, Stig A. Borgvang and Kjersti Dagestad

EVENING PROGRAM...

**The following topics are left out/only partly covered because of time constraints during the stay in Norway. These topics will be covered during the workshops in April.**

- 1. Detailed training in use of the ADACS**
- 2. The Report Generator**
- 3. Import of data**
- 4. The User Database Manager (UDB)**
- 5. Water Quality Classification system**
- 6. Pollution Sources**