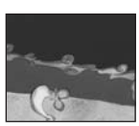
Noticias FAD/FEV

Convocatoria de concurso para elaborar el estudio de viabilidad «Previsión de inundaciones y sistema de alarma en la Cuenca de los ríos Mun y Chi» (Reino de Tailandia)

El Royal Irrigation Department (RID) de Tailandia convoca a las empresas españolas a un concurso para elaborar el Estudio de Viabilidad sobre «Previsión de inundaciones y sistema de alarma en la cuenca de los ríos Mun y Chi».

Este Estudio de Viabilidad, aprobado en la Comisión del FEV de 23 de septiembre de 2004, tiene un coste aproximado de **hasta 300.000 Euros** y será financiado con cargo a la Línea de Financiación de Estudios de Viabilidad (FEV Modalidad Pública), cuyos recursos provienen del Fondo de Ayuda al Desarrollo.

Las empresas españolas interesadas en la realización del estudio deberán presentar sus ofertas, en las direcciones que se detallan más abajo, según la documentación contenida en los Términos de Referencia **no más tarde de las 12:00 horas del día 7 de septiembre de 2005 y en cada uno de los destinos señalados en esta convocatoria.**



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El *Royal Irrigation Department de Tailandia,* bajo la supervisión de la Administración española, evaluará las ofertas presentadas de acuerdo con los baremos recogidos en los Términos de Referencia.

Se presentarán, dentro del plazo previsto y en las direcciones que se indican, los siguientes ejemplares:

— Dos ejemplares en inglés, que se entregarán al Royal Irrigation Department de Tailandia

— Un ejemplar en español, que se entregará a la Administración española (Subdirección General de Fomento Financiero de la Internacionalización) en Madrid.

1) ROYAL IRRIGATION DEPARTMENT OF THAILAND

Persona(s) responsable(s):	Mr. Shartri Keoplung
	Director of Office of Project Management
Dirección:	811 Samsen Road, Dusit, Bangkok 10300
Teléfono:	(66-2) 2431739
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2) SUBDIRECCIÓN GENERAL DE FOMENTO FINANCIERO DE LA INTERNACIONALIZACIÓN

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Para cualquier información pueden dirigirse a la SUBDIRECCIÓN GENERAL DE FOMENTO FINANCIERO DE LA INTERNACIONALIZACIÓN y a:

OFICINA ECONÓMICA Y COMERCIAL DE LA EMBAJADA DE ESPAÑA EN TAILANDIA
Consejero Económico y Comercial: D. Rafael Domínguez Pabón - a partir del 1-9-05: Dª Loreto Taborga Curto
Dirección: 159 Serm-Mit Tower, 26th. Floor - Sukhumvit Road Soi 21
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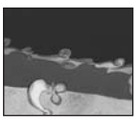
Flood forecasting and warning system in Mun and Chi river basins



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I. Project justification

I.1. Chi river basin

The Nam Chi River basin is located in the North eastern of Thailand with a total drainage area of 49.700 km^2. It is also located in the tropical monsoon region, which has distinctive dry and rainy seasons and heavy rainfall. The slope of Nam Chi River basin is steep at the upstream mountain area and is flat at the lower part especially near the confluence to the Mun River. The annual rainfall in the basin varies from 1.000-1.400 mm. High intensity rainfall often occurs causing flash flood from the upstream and stagnated flood at the downstream part where high water level of Mun River, occurring almost at the same time, also decrease drainage capacity of Chi River. Therefore flood water level and duration are accumulated at the area near Chi River mouth. The flooding area of Chi River is connected to the flood area overflow from Mun River.

Not only heavy storm or high intensity rainfall cause flash and stagnated flood but also in capacity of Chi River is reduced by soil erosion, sedimentation, insufficient flow outlet of road. Moreover improper land use in flood plain area also cause higher flood level and longer flood period.

Flooding in Chi River basin has long been a recurrent problem, which has more severe scale according to improper land use and road and highway construction. More resident area is developed in the flood plain area, hence number of houses and properties damaged from flood are higher. It has been worsened considerably over the last two decades. Deforestation in the river basin also creates heavier flood problem. The north eastern part of Thailand has been rapidly developed in transportation system.

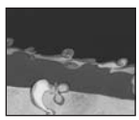
Transportation way obstructed water flow direction that decreased drainage efficiency. Based on the historical data, significant flooding appears to occur every 2 to 3 years. The flood always occurred 2-3 times a year. Most damaged flood occurred in 1978, 1995, 2000 and 2001.

Flood occurred in Nam Chi River Basin not only causes damage to its own area, but also causes flood to the downstream part, lower Mun River basin. The big city, Ubonratchatani, located downstream of Chi-Mun confluence suffers from flood from Mun and Chi River.

One of the main causes of worsening flooding in the Nam Chi River, and especially every province in this area, is due to land subsidence affecting the urban areas. Flood protection infrastructure such as flood wall may protect one specific area while at the same time causing higher flood level to another nearby area. Therefore flood prevention and mitigation both in urban and rural area should be planned together as a master plan to see the causes and effects among each other. Flood protection is important in the Nam Chi River because of the risk of large-scale damage to public and private property.

I. 2. Mun river basin

The Mun river, drainage area of 70,961 km^2, is the largest right bank tributary of the Mekong. There are about 20 main tributaries of the Mun river and Chi river basin is the biggest tributary. In an average year its contribution to the Mekong is approximately 25,000 MCM, which is equivalent to an annual runoff 210 mm, or 600 m3 /s. Roughly one-third of this amount comes from the Chi river, a left bank tributary of which drainage area is 49.000 km^2. The Chi river joins the Mun river at about 100 km upstream of the Mun river confluence to the Mekong river.



The Mun River is liable to flooding, particularly in its lower and middle reaches. Floods also occur frequently along tributaries in the Tung Kula Ronghai area (low land at middle reach upstream of the Chi river confluence) and the Mun river mouth (downstream of the Chi river confluence). Floods occur annually during the times of peak flows (August/September). Rice yields are usually reduced, but floods can also be beneficial to them. The floods occur principally in rice-growing areas and in urban areas. Human injuries and deaths are few, as it is not flash flood and flood occurs annually. It is possible to reduce flooding and its impact by establishing flood control projects. Potential floodplain sites are also of limited size due to the flat terrain. High value infrastructure development (e.g. industrial sites) located on flood-prone areas has tendency to increase, therefore control measures would be necessary.

Flooding is an annually recurring phenomenon in the Mun basin. First flooding events may start with the onset of the monsoon in May-June, when rainwater accumulates in depressions or where drainage is obstructed by man-made structures. These floods, which may affect 50.000 ha of cultivated land, can occur at any time during the wet season in response to heavy rainfall. Characteristic of this type of flooding is caused by its flat slope at the lower reaches, heavy and flash flood from the Chi river (steeper slope and short distances of 1,017 km), high water level at downstream part as well as land utilization in the flood plain areas. Moreover man-made infrastructure, such as roads, has insufficient drainage capacity Generally flood is more severe and last longer year by year. On average, these floods inundate about 100.000 ha of land along the river banks, of which approximately 34.000 ha is cultivated.

Considering flood extent, duration, severeness and control/mitigating measures, it is necessary to make a distinction between the following types of flooding:

— River flooding

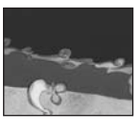
— Floods due to impeded drainage

• *River flooding.*Annually the Mun River inundates vast areas along its middle and lower reaches for prolonged periods of time. Extensive flooding is also experienced in the lower reaches and the Mun river mouth.

• *Floods due to impeded drainage.* Local terrain conditions, natural depressions or man-made obstructions (road infrastructure, embankments), may impede drainage of rainwater. As the majority of the land in the Mun basin is extremely flat, this type of flooding is a potential threat to vast areas in the catchment. Sometimes this flooding is deliberately invoked (farmers blocking drains) to catch fish or to store water for irrigation.

As the Chi river is the largest and distinct tributary from others of the Mun river. Flood in the Mun river upstream and downstream of the Chi river confluence is caused by the huge and flash flood from the Chi river because of its steep slope and short river length comparing to slope and length of the Mun river. Together with the study for the Chi river, flood study in the Mun river basin will be complete.

II. Process of Study



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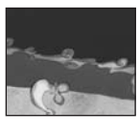
A	**Topography**
A.1	Compilation of all the available cartographic data (map, topography)
A.2	Digitalization of topographic maps (level contours) it these are not in that format, and make them 3D
A.3	Inventory of major hydraulic infrastructure along the river
A.4	Travel expenses and allowances inside Thailand
B	**Hydrology**
B.1	Compilation of al! the available hydrologic data (discharges, rainfall).
B.2	Statistical analysis of the hydrologic data.
B.3	Construction of HEC HIMS (or similar) hydrologic model of the basin.
B.4	Estimations of parameters for the model (C, Tc, synthetic hietographs).
B.5+6	Simulations, analysis of the results, conclusions and proposal of ideas.
B.7	Travel expenses and allowances inside Thailand.
C	**Hydraulics Analysis and Modelling, GIS Floodplain Delineation**
C.1	Preliminary hydraulic modelling of the river. Pre-processing and simulation.

C.4	Analysis and interpretation, Areas most affected. Assessment of hydrological models.
C.5	Assessment of prevention plans.
C.6	Assessment of flood mitigation measures (structural and non-structural).
D	**Analysis of Hydrological Warning System**
D.1	Inventory of available meteorological-hydrological data acquisition infrastructure (measuring stations and gages).
D.2	Travel expenses and allowances inside Thailand.
E	**Basic economic and technical analysis of the different alternatives**
F	**Draw up and writing of final report and documents and preparation of deliverables**
G	**Technical Transfer**
Detail of these tasks is briefly described as follows.	

A. Topography



• Topography base data will be based on available map at present (for instance 1:50.000 or larger). However, the available map 1:50.000 shows 10 meter elevation interval which is not sufficient to draw river cross section but may be roughly sufficient for flood area. In addition to available topography map, survey of a few cross sections of river should be done with far distance interval. Interpolation between cross section will be done to draw up for all cross section to study flood water level along River.

• Chi river has the length of 1,017 km. In addition to upstream and downstream boundary, therefore about 5 cross section survey (2 sections at boundary and 3 sections for each 15-20 km. interval) should be done. Mun river has the length of 641 km. There is some available river cross section survey of the Mun river but some cross section survey about 10 sections should be done to cross this data as there are many change in the river bank and river flood plain. This survey as well as topography map of 1:50.000 for flood plain and land use map shall be sufficient to delineate a preliminary floodplain area in a GIS environment.

• This preliminary floodplain will determine the extension of the area, which is intended to be surveyed more precisely in a later phase of study. In the other hand, the same preliminary floodplain will help to analyze what is the most suitable methodology (according to required accuracy) to perform the topography works after the feasibility study: using conventional topographic methods or, alternatively, using airborne devices such as laser mapping technology LIDAR. Both possibilities will be included in the feasibility study.

• In this feasibility study, it will be necessary to carry out an inventory of the hydraulic structures existing along the river, such as dams or channels, determining its main geometric and hydraulic characteristics and marking its situation on a map. Eventually, in the following stage of the project (after. FEVs), more detailed topography will be done.

A) Tasks will be

A.1. Recompilation of ah the available cartographic data (maps, topography)

A.2. Digitalization of topographic maps (level contours) it these are not in that format, and make tem 3D

A.3. Do an inventory of major hydraulic infrastructure along the river.

A.4. Travels and allowances inside Thailand related to A.1 and execution.

These tasks will be finished within *3 months* from the start of the project

B. Hydrology

• A hydrologic study should be included in the feasibility study. It should start by making a collection with ah the available Information, such as rainfall and discharge data, and a description of the places affected and the effects caused by previous flood events. A statistical analysis of the raw data should be done in order to define a period of recurrence for each rainfall.

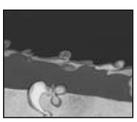
• It is possible to develop a simple preliminary hydrologic model of the basin with HEC HMS or some other convenient public domain software. The preliminary hydrologic model will provide some values for discharges and discharge hydrographs able to be used In subsequent hydraulic computations.

The preliminary hydrologic model could be used for several purposes, such as:

— Dam design (whose usefulness is obtained by computing the decrease of peak discharge).

— Effects over the basin hydrology caused by large-scale changes in land use (decrease of time of concentration and subsequent increase of peak discharge).

— To obtain the lag time of flood propagation in river reaches (which can be used to design flood forecast systems, etc).



The preliminary hydrologic model can also be used to test possibilities of flood forecasting (which is usually included In emergency plans and mitigation plans). The hydrologic model also is useful to point out the convenience of real time measuring stations with rainfall or discharge (water level) gages.

A standard HEC HMS model includes:

• A division of the main basin in several subbasins.

• A division of the main course (and maybe some major tributaries) in several reaches.

• An estimation of the runoff coefficient C for each subbasin.

• A time of concentration Tc for each subbasin.

The model provides discharges at certain locations as a function of rainfall hietographs.

B) Tasks will be

B.1. Compilation of all the available hydrologic data (discharges, rainfall).

B.2. Statistical analysis of the hydrologic data.

B.3. Construction of HEC HMS (or similar) hydrologic model of the basin.

B.4. Estimations of parameters for the model (C, Tc, synthetic hietographs).

B.5. Simulations.

B.6. Analysis of the results, conclusions and proposal of ideas.

B.7. Travels and allowances inside Thailand related to B.1 execution.

B.8. Flood forecast models.

These tasks will be finished within *4 months* from the start of the project.

C. Hydraulics Analysis and Modelling, GIS Floodplain Delineation

• A preliminary hydraulic model will be applied to determine flood water surface levels based on the available topographic data, and based on the discharges supplied by hydrologic analysis.

• After computed this preliminary floodplain, it can be compared with the available information about historical events In order to fix parameters in the hydraulic model.

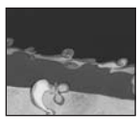
• Analysis and interpretation of the results should be done to asses the most accurate hydraulic and hydrological models to apply at Phase II (after FEV). In order to more realistically model the behaviour of the river and the basin.

• Taking advantage of GIS processing tools, and the digital terrain models, the first floodplain maps will be delineated and displayed.

C) Tasks will be

C.1. Preliminary hydraulic modelling of the river. Pre-processing and simulation.
C.2. Flooded area as well as satellite images on flood event to calibrate parameters in hydraulic model
C.3. Floodplain delineation
C.4. Flood forecast model
C.5. Flood-related risk maps delineation.
C.6. Analysis and interpretation. Areas most affected. Assessment of hydrological models.
C.7. Assessment of prevention plans.
C.8. Assessment of flood mitigation measures.
C.9. Travel & allowances Inside Thailand related to C.2 execution as well as satellite images acquisition.

These tasks will be finished within *6 months* from the start of the project.



D. Analysis of Hydrological Warning System

An establishment of the requirements for a hydrological warnings system in real time will be done. This analysis will study all the aspects involved in a hydrological network, based on the results of the hydraulic modelling and existent infrastructure

The objective of such a system is to improve flood forecast and flood management allowing a fast response when a flood situation happens, taking the convenient actions for damage prevention and mitigation. The possibility of establishing a centralized control centre allows the best management/ guideline of all water control structure for flood mitigation of Nam Mun and Nam Chi river basins.

D) Tasks will be

D.1. Inventory of available meteorological-hydrological data acquisition infrastructure (measuring stations and gages).
D.2. Travels and allowances inside Thailand related to D.1 execution.
D.3. Study and analysis of actual data acquisition infrastructure.
D.4. Basic design of network for a hydrological warning system.
D.5. Basic design of automatic data acquisition and data transmission system for a real time hydrological warning system.
D.6. Basic design of surveillance, control and management central station and office for a hydrological warning system.

D.7. Basic design of GIS or similar hydrological management tool for a hydrological real time network.
D.8. Providing management/guideline of all water control structure for flood mitigation and flood risk management of Nam Mun and Nam Chi river basins.

These tasks will be finished within *8 months* from the start of the project

E. Basic analysis of different alternatives and formulate overall basin flood mitigation plan

All the alternatives for flood forecast, prevention and mitigation and its effects on land use management, infrastructure and urban development, etc., which were pointed out on the works described In A-B-C-D, must be put together in order to achieve a complete view of flood problems In Nam Mun an Nam Chi river basins.

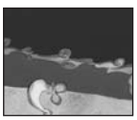
These alternatives intended can vary from hydraulic structures such as dams, dikes, levees, bridges, roads; to management plans, communication procedures or warning systems, and its interest for Thailand administrations, local or national.

Different alternatives can address to the same purpose in different ways but also can be complementary. So each alternative will be compared to others in economic, technical, suitability, etc.

E) Tasks will be

- Basic economical and technical analysis of the different alternatives.

These tasks will be finished within *9 months* from the start of the project.



F. Draw up and writing of final report and documents and preparation of deliverables

These tasks will be finished within 10 months from the start of the project.

F.1. During the elaboration of the study, the company awarded the contract will submit 10 copies of both hard copy and paper of inception report, interim report, final report and executive summary report stating the tasks carried out during the relevant period.
F.2. The company awarded the contract must submit the input data, criteria study and install the program studied including the output of Mathematical Model of Flood Forecasting and Warning System in Mun and Chi River Basins.

G. Technology Transfer

Training will be set up in terms of Technology Transfer and on the job training to the Thai counterparts.

III. Work Plan

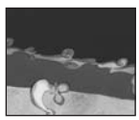
Project study period is 10 months

Task	Tasks	1	2	3	4	5	6	7	8	9	10
A	Topography	→→	→→	→→							
B	Hydrology	→→	→→	→→	→→						
C	Hydraulic analysis and modelling, GIS floodplain delineation	→→	→→	→→	→→	→→	→→				
D	Analysis of hydrological warning system					→→	→→	→→	→→		
E	Basic analysis of different alternatives							→→	→→	→→	
F	Draw up and writing of final report and documents and preparation of deliverables									→→	→→
G	Technical Transfer										→→

IV. Project Cost

Cost will be classified conforming to individual task. Total cost will also classified as follows:

1) Personnel cost
2) Direct cost
   - Survey cost
   - Training cost
   - Travelling and allowance cost
3) Project administration cost
   - international travel expenses and allowances
   - Project coordination
   - Communication
   - Office facilities / consumable materials
   - General administration, etc.
   - Financial expenses, etc.



V. Information to be submitted in the tender

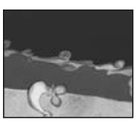
1. The companies interested in the tender must present their offers according to the conditions established by these Terms of Reference. Three copies will be presented, as follows: two copies in English for the Royal Irrigation Department of Thailand and one copy in Spanish for the State Secretariat for Tourism and Trade. The copies will be forwarded to the following address:

ROYAL IRRIGATION DEPARTMENT OF THAILAND
Person in charge: Mr. Shartri Keoplung
Director of Office of Project Management

Fax: (66-2) 2431739
E mail: shartrik@rid.go.th
Telephone: (66-2) 2431739
Address: 811 Samsen Road, Dusit, Bangkok 10300

SECRETARIA DE ESTADO DE TURISMO Y COMERCIO
Dirección General de Comercio e Inversiones
Person in charge: Ana M. Oviedo Muñoz
Address: Paseo de la Castellana 162, planta 9- 28046 Madrid
Telephone:91- 583 52 89
Fax: 91 349 35 12
E mail: aoviedo@mcx.es

2. The offer must include both technical and economic proposals. The technical proposal will include: the description of the proposed objectives and works, the strategy and the method of realization of the works, the activity schedule (working schedule) and a break down of the hours each expert will work on the project by task. The economic proposal must include the cost of all items needed for the realization of the project and it will be presented in detail, clearly indicating the units, the cost of each unit and the total cost for each item. The cost of each expert of the working team, the experts´ schedule and the expenses for the study elaboration (travels, per diem and other expenses) will be presented in detail



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3. The offer must emphasize the company experience in the field of water management. The company must prove its experience in similar projects in this field. In particular, the company must submit the following information:

- Financial records from the last year available (balance sheet and audited accounts)
- General information on the company:
- Share ownership
- Date of incorporation
- Turnover data for the last 5 years
- Number of employees. Full time and part time employees. Employees with a high education diploma
- Detailed information about the most important projects carried out, indicating clearly: client name, contract value, start and finishing dates for the projects, working team and description of the project. Studies similar in technical content and objectives with the one intended to be contracted through this technical assistance should be particularly emphasized. References from the beneficiaries will also be presented.

4. Detailed information on the structure and experience of the proposed working team and the resumes (3 pages maximum) of the proposed staff will be presented, including at least the following data:

- name
- place and date of birth
- nationality
- proposed position within the project
- titles and courses

- languages (English is a requirement)
- experience in similar projects (indicating the responsibilities within)
- other (academic experience, publications etc)

General requirements for key experts:

- studies in the field
- very good level of English
- relevant experience (list of projects)

5. Any change in the structure of the working team proposed by the company must be submitted both to the Thai and to the Spanish Administration for approval and if not accepted, it can be a reason for exclusion from the bid or for contract cancellation.

6. The firm awarded the contract will present a list of potential Spanish suppliers of goods and services required for the execution of the project.

7. The offers must have a period of validity of 6 months during which the participant companies are committed to honour the conditions of the offer, especially those concerning the structure of the working team, scope of the project, activities proposed for the objectives´ realization, methodology, period of execution and price.

8. In case of association between consulting companies or subcontracting, the competencies and responsibilities of each one of the associates or subcontracting parties must be clearly defined.

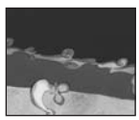
9. During the elaboration of the study, the company awarded the contract will submit periodically a progress report stating the tasks carried out during the relevant period, existing and foreseen problems, proposed actions and possible deviations from the initial schedule.

10. The maximum percentage allowed for local expenses will be equivalent to 15% of the total contract amount.

11. Payment method:

- 25% after signing the contract, with the «no objection» from the Spanish Administration
- 25% after reaching and intermediate milestone to be agreed upon by the Royal Irrigation Department of Thailand and the contract - winning company. The Client shall sign the corresponding certificate and send it to the Spanish Administration to receive the «no objection».
- 50% once the study has been concluded and approved by the Thai and the Spanish Administrations.

12. The works must begin as soon as the contract - winning company considers appropriate and no later than two weeks after signing the contract.



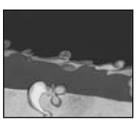
Working Terms

The lump sum fee for the commission will be EUR 300.000. This commission will be funded by a grant from the Spanish Feasibility Studies Financing Facility (FEV).

Selection/Award Criteria

The selection and award criteria will be as follows:

Technical Proposal	**80**
• Professional experience and technical capacity	15
• Methodology and working program	20
• Working experience in the country, in FEV and multilateral financed projects	25
• Adequacy of the working team skills (C.V.)	10
• Knowledge of the country and of English language and experience in similar projects	10
Economic Proposal	**20**
	100



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