

**DUTCH RISK REDUCTION TEAM-DRR14MX05
"FOLLOW UP MISSION"**

RIJKSDIENST VOOR ONDERNEMEND NEDERLAND

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1 Introduction

During the period of June 15-22 the first part of the follow-up mission of the DRR (Dutch Risk Reduction Team – Annex 1 for team members) was carried out. The assignment was partially carried out in the Netherlands (June 15), and partially in Mexico-Tabasco from 16-20 June. The objective of this follow-up was to further detail the priorities identified during the first mission, to seek political support for the initiatives proposed and to materialize the cooperation between the Netherlands and Mexico in bringing these initiatives further and achieving the objectives identified (see Annex 2 for the terms of reference).

The programme of the fieldtrip in the Netherlands can be found in Annex 3, while the programme during the period of 17-19 July can be found in Annex 4. June 16 and 20 were travel days.

The objective during the fieldtrip in the Netherlands was to discuss, in between site visits, the priorities identified during our first DRR mission to Mexico for federal level; Guerrero/Acapulco, building with nature in the gulf of Mexico and the development of a monitoring system to analyse the effectiveness of policies.

The objective for the visit to Tabasco was to detail the priorities and check whether these priorities were still broadly supported.

The following presents a further detailing of the prioritized initiatives. These first descriptions of projects provide the basis for our Mexican counterparts to make budget reservations and to identify in which way the cooperation with Dutch experts and the use of Dutch expertise can be materialized.

It is important to underscore that again the mission has received crucial assistance from Conagua, the Secretario de Desarrollo Económico y Turismo and of the Royal Netherlands Embassy in Mexico. Without their help the team members of the mission would not have been able to achieve the results presented in this document. We further thank the NWP for providing the opportunity to meet with our counterparts in the Netherlands.

For further introduction of the objectives of the DRR team and the identified challenges, priorities and opportunities to materialize cooperation between Mexico and the Netherlands in the field of sustainable management of water resources we refer to the report of our first mission: DUTCH RISK REDUCTION TEAM-DRR14MX02 "SCOPING MISSION ON INTEGRATED WATER (FLOOD) MANAGEMENT EXPERTISE IN MEXICO", april 2014.

Although the first aim of this DRR initiative is directed towards flood risk reduction, from the perspective of integrated management, water quality issues and risks of draughts have also been touched upon in the discussions with our counterpart.

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Conagua at federal level

On June 15 a field trip was organized by NWP to the Maeslantkering and the Sand Motor south of The Hague.

The objective of these site visits was to present some of the outstanding Dutch water expertise to a group of high Mexican officials and to discuss in between and during the site visits the analysis made during our first DRR mission. During the discussions with David Korenfeld (Director General Conagua), Felipe I. Arreguin Cortes (Subdirector General Técnico) and Antonio Gutierrez Marcos (Director Local Tabasco) these results were still supported and of the three priorities at federal level special emphasis was put on the water plan for the state of Guerrero. An integrated study should lead to a long term vision with short term measures to confront the challenges of the city of Acapulco. This requires integrated watershed management including the adaptation of the urban water management system. Further detailing of possible Dutch support is to be done during the mission in September.

Furthermore, the opportunity was given to discuss with the Director of the regional branch of Conagua, Antonio Gutierrez Marcos, the priorities from their point of view at state level. These priorities have been taken in to consideration while detailing the first proposals for Tabasco.

3

State level: Tabasco

3.1 ENDORSEMENT OF PRIORITIES

Large part of this mission was focussed on obtaining the political support for the proposed priorities. Results of our last mission were discussed with a number of high level decision makers including the 'Comisión de Recursos Hidráulicos de la Cámara de Diputados Local'. This commission is assembled to discuss all water related issues and bring together all different political parties with the objective to arrive at a shared vision on water management for the State of Tabasco.

Without this political support or vision on water management the chances that projects will be financed is small. Therefore, the 'Comisión de Recursos Hidráulicos de la Cámara de Diputados Local' will also be invited by the RNE to participate in a brainstorm session to identify their worries, their vision on future developments and their thoughts on how these challenges can be met from a water management point of view. It is perceived crucial to involve this commission intensively in the preparation of the Vision 2040 for Tabasco to ensure swift implementation of the required initiatives.

Full support was also received from the 'Coordinador General de Protección Civil', the 'Secretaría de Ordenamiento Territorial y Obras Públicas' the 'Director General de la Comisión Estatal del Agua y Saneamiento' and the 'Coordinador General del Sistema de Agua y Saneamiento'.

3.2 PRIORITIES

Further discussion with stakeholders led to the following list of measures:

- Vision on integrated water resources management for the next 25 years
- Integrated water management plan for Villahermosa
- Improving the water quality of the laguna de las ilusiones and sustainable management of the lake
- Capacity building
- Transboundary cooperation on water management of the Ucamacinta river
- Improving the early warning system
- A study on the erosion and sedimentation in the Grijalva and Samaria river

In this chapter the first draft proposals for these initiatives are presented. The objective of these first thoughts is to have the required information to allocate the required funds before the start of the summer holidays.

It is important to underline that these are draft proposals. Planning is tentative and budgets should be considered as orders of magnitude. Further detailing will be done during the proposal phase. When requested, these will be prepared in close cooperation with our counterparts.

3.3 VISION: INTEGRATED WATER RESOURCES MANAGEMENT 2040

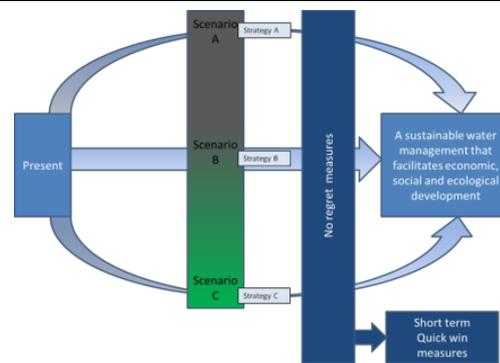
Project name: **Water Vision for the State of Tabasco 2040**

With the transformation of the energy sector an increasing development rate is prognosticated. International oil & gas companies will invest in the region with all developments that will follow in relation to transport, telecom, infrastructure, urban development, etc.

This development will also have its effect on the water system. Likewise, to facilitate this development it is needed to anticipate and assure that the water system and its management is able to support this economic development. Not only the economic development will be considered. Also the social and ecological development will have to be taken in to account to assure the proper balance between the three P's (people, planet, profit) and with that a sustainable development of the state Tabasco.

Objective:

- Analysis of the actual situation – inventory of existing information
- Analysis of the developments in Tabasco
- Strategy to assure that the water system facilitates the economic, social, ecological development of Tabasco



Involved actors:

- Comisión de Recursos Hidráulicos de la Cámara de Diputados Local
- Autoridades federales y estatales
- Municipios
- Universidades
- Sector privado

Plan of action:

1. Identification of available information (desk study, interviews, workshops, draft documents)
2. Identification of the remaining challenges (roundtables, workshops, seminar, desk research, interviews, draft documents)
3. Identification of the development path chosen by Tabasco (brainstorms, working sessions, workshops, scenario analysis)
4. Gap-analysis on what is and what shall be (workshops, scenario analysis, strategy development)
5. Identification of no regret, short, middle and long term measures (workshops, seminar)
6. Reporting and final presentation

Planning:

Phase / month	1	2	3	4	5	6	7	8
1 inventory	X	X						
2 challenges		X	X					
3 development Tabasco			X	X				
4 gap analysis				X	X	X		
5 measures						X	X	
6 reporting presentation								X

There will be four missions to Tabasco to carry out the plan of action. These will be missions of two weeks with the experts in months 2,4,6 and 8)

Added Value Netherlands:

- Experience in the Netherlands and many foreign countries (Mexico, Colombia, Brazil, Mozambique, Vietnam, Bangladesh, Indonesia, Myanmar)
- A broad approach on integrated management of water resources taking in to consideration all water resources.
- An Integrated approach to people, planet and profit (socially acceptable, financially viable and ecologically sustainable).
- Coverage of all aspects concerning good water governance.



Preliminary estimation budget: € 450.000 (estimation based on experience with other comparable projects in different projects)

3.4 INTEGRATED WATER MANAGEMENT PLAN FOR VILLAHERMOSA

<p>Project name: Integrated water management plan for Villahermosa</p> <p>Objective: The Water supply and the urban water system of the city of Villahermosa need to be improved. There is an urge for solutions for the drinking water system which is failing more and more, for the improvement of the wastewater discharge system and solutions for problems during intensive and long periods of rainfall. This influences not only liveability but also affects the environment. First of all, these facts require adequate short term measurements. Furthermore there is also need for a long term strategy as a framework for future measures (no regret measures). To realise this we advise to follow two parallel tracks:</p> <ol style="list-style-type: none"> 1. developing a long term strategy and short term measures that will provide an improvement of sewer functioning, urban drainage and water supply. 2. Implementing multiple pilot projects and setting up supervision. This will enhance transfer of knowledge and provide opportunities to experience and learn from the Dutch approach.
<p>Plan of action:</p> <p>To achieve above mentioned objectives we suggest a plan of action that comprises three phases.</p> <p>Phase 1 Inception Phase</p> <p>The goal of this phase is to get a fast grip on the complex situation and identify and understand the key water problems of Villahermosa and to set up a project team.</p> <ol style="list-style-type: none"> 1. <i>Assessment of present situation</i> The first step is to collect information (national policies, stakeholders, local regulations, normal water use, normal and extreme rainfall, main surface water system, storm water runoff system, most urgent problems (hotspots)). 2. <i>Set up of a local project team</i> Together with all stakeholders the hotspots are visited. A local project team and steering committee with the local authorities will be established during the visit. 3. <i>Decomposition of the area</i> <ol style="list-style-type: none"> a. Determine the main structure of the current water system. Schematic description of the drinking water, surface water and urban drainage system. b. Identify the different types of urban drainage (for example storm water runoff combined system/surface runoff/non) c. decomposition of the area in the different type of drainage areas. d. Identify the most important (e.g. odour) problem locations. <p>The result of phase 1 is insight in de complex situation and potential short term measures including preliminary costs.</p> <p>Phase 2 Pilots and knowledge transfer.</p> <ol style="list-style-type: none"> 1. For every specific and typical situation of the urban drainage and sewerage system and water supply a draft plan is made for a (standard) approach for this specific part. These plans can be used <i>as a blue print</i> for all future projects. The goal of the blue print is to empower the municipality and other stakeholders to develop future measurements independently by using Dutch experiences. We take into account 5 different system types. (mission 2.1) 2. Run pilots for short term measurements. Different type of drainage areas are selected to set up pilot projects together with the local responsible and involved parties. To realise an optimal transfer of knowledge ARCADIS will guide and supervise these pilots. The results are monitored and reported. (mission 2.2) 3. Supervision and knowledge support, short courses, training on the job. (mission 2.2) <p>Phase 3 Vision and Strategy</p>

In deliberation and cooperation with the local project team and steering committee (along with the collected data), we develop a long term strategy and a main structure of the urban water system. First we determine the scope, vision and core goals of the project and how to realise these goals. Followed by the main design and principles of the urban drainage and water supply structure.

Road map for implementation of measures:

- i. Investments required responsibilities.
- ii. Planning time horizon
- iii. Stake holder involvement
- iv. Public awareness and communication strategy.
- v. Knowledge transfer and capacity building – short courses, training (on the job)

Result: A long term strategy to create a sustainable and climate proof framework for future measurements. The final plan can be completed 9 months after the start of the project.

Added Value Netherlands

Extensive experience with urban drainage, sewerage and water supply, development of innovative measures, development of strategies in the Netherlands and abroad, application of long and short term measures, integrated approach including awareness building, institutional capacity building, experience with preventive as well as end of pipe measures, climate proof, sustainable, proven technology.

Preliminary estimation budget:

Phase 1: € 35.000

Phase 2: € 200.000 -€ 300.000

Phase 3: € 100.000

Tentative planning :

Phase 1: 1 months:

Two weeks mission (mission 1.1) including meeting with the responsible authorities and stakeholders, field visit and investigate and discuss options for short term solutions with local authorities. The result will be presented in a concise report that could be presented 2 weeks after the mission. This includes potential options for short term measures and a preliminary estimate of the costs.

Phase 2: 4 months

Work out a detailed plan for the execution of 5 specific and typical pilot projects (focused on promising short term measures) and prepare tender document for execution of the pilots by local contractors. This will be discussed with the relevant stakeholders and authorities (mission 2.1). Set up a track for supervision and knowledge support during and after execution (mission 2.2).

Phase 3: 9 months

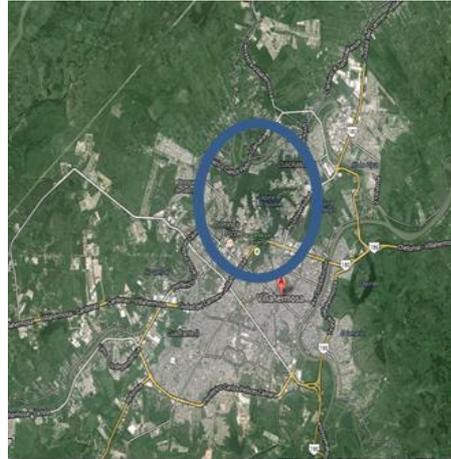
- Project start up (mission 3.1 to be combined with mission 1.1)
- Collecting data
- Workshop to identify challenges and goals
- Study effectiveness of the long term measures (sustainability, climate proof)
- Stakeholder involvement workshops (mission 3.2)
- Drafting the long term strategy and present the results in a final seminar (mission 3.3)

3.5 IMPROVING THE WATER QUALITY OF THE LAGUNA DE LAS ILUSIONES AND SUSTAINABLE MANAGEMENT OF THE LAKE

Project name: Sustainable Management of the laguna de las ilusiones

Objective: the laguna de las ilusiones is heavily contaminated, foremost by nutrients. This pressure results from an insufficiently operating sewerage system. Many households emit their sewerage water directly in the lake. As a result there is excessive algae bloom and the lake cannot be used anymore for recreational purposes.

Furthermore the total area of the lake is diminishing. On aerial photos this process can be clearly seen. It is estimated that the area has diminished from 320 ha in the early 70ties to only 240 at present, mostly as a result of illegal encroachment. From ecological as well as water management perspective it is important to assure that this process is brought to a halt.



The objective is to prepare a long term strategy and short term measures that will lead to the improvement of the quality of the lake and to halt the diminishment of the lake area. This strategy will use as starting point the initiatives already carried out or planned by Conagua.

Plan of action:

Phase 1

1. Assessment of the present situation, including:
 - Institutional setting (policies, legislation, responsible institutions)
 - Water quality based on existing data if present. Focus on hygienic aspects, eutrophication and algal blooms, oxygen depletion. Design of a monitoring program if not existing at present and if no data are present.
 - Assessment of pressures (sources of pollution, loads other pressures – dumping solid waste, building in the lake area)
2. Establishment of a local project team (multi sector approach: Conagua, UJAT, ministry of health, etc.) and a steering committee with the local authorities responsible.
3. Identifying short term measures to improve water quality and to solve most urgent problems. Such as: Flow (load) diversion, flushing, in lake treatment to fixate phosphorus, treatment of algal blooms (using peroxide). Including estimation of costs.

Two weeks mission (mission 1.1):

- Meeting with responsible authorities
- Field visit and studying existing data
- Investigate and discuss options for short term solutions with local authorities

Design and execution of a monitoring program if required. A first estimate of the present water quality and pressures can be obtained from a field survey.

Result:

- Insight in the present water quality and major sources & pressures
- Potential options for short term measures to improve water quality identified including a preliminary estimate of the costs

- Establishment of cooperating between responsible authorities

Phase 2

4 Execution of short term measures.

Work out a detailed plan for the execution of promising short term measures including:

- Drafting a plan, to be discussed with relevant stakeholders en authorities (mission 2.1)
- Collect required information
- Work out draft plan in detail
- Present detailed plan to steering committee. (Mission 2.2)
- Prepare tender document for execution by local contractors
- Design of a program to monitor the impact of the measures during and after execution.

Result:

Detailed working plan & tender documents

Phase 2 can be completed 3 months after the start of the project.

Phase 3

5 Develop long term strategy together with local team and steering committee.

Technical:

- System analyses, Water Quality Modelling including sources (Sobek emission module).
- Determine maximum allowable load
- Identifying long term measures on source control (integration of Water plan for Villahermosa)
- Monitoring
- Determine long term measures
- Study coast effectiveness of the long term measures
- Stakeholder involvement workshops
- Drafting the long term strategy
- Final seminar to present the results
- Short courses on water quality modelling

Added Value Netherlands

Extensive experience in the Netherlands with measures to combat eutrophication, development of innovative measures, development of strategies in the Netherland and abroad, application of long and short term measures, integrated approach including awareness building, institutional capacity building, experience with preventive as well as end of pipe measures, successful water quality improvement programs, proven technology.

Preliminary estimation budget:

Phase 1: € 45.000

Phase 2: € 35.000 - € 60.000

Phase 3: € 100.000 – € 125.000

Tentative planning :

Phase 1: 1 months

Phase 2: 3 months

Phase 3: 9 months

3.6 CAPACITY BUILDING

Project name: **Capacity building for sustainable water management in Tabasco**

Introduction

Tabasco is facing major challenges in the coming decades. Due to a reform of the energy policies in Mexico major investments in the oil industry and related economical activities are to be expected. Without new policies, this will lead to increasing social and environmental problems, while limiting economic growth. A growing population needs more drinking water, with a better quality. Climate change will enhance the existing flooding problems in Tabasco. To face these challenges a highly trained staff at universities, research centres, state and local government, etc. is needed. To support policy analyses and planning expertise in the field of modelling, setting up, monitoring and evaluating the aquatic system, knowledge in the effects of climate change, economic and demographic developments and policies is essential.



Objectives

The objectives for this study are:

1. Capacity building in Tabasco
 - Exchange of expertise between Tabasco, federal and Dutch experts in the field of water management and climate change adaptation
 - Training of PhD-students and MSc-students
 - Scientific research and applied research projects
2. Enhance scientific modelling expertise Tabasco climate research centre
 - Exchange expertise in the field of climate change effects on water management, ecosystems and social economic infrastructure and adaptation strategies
 - Exchange of computer models and modelling and monitoring expertise

Plan of action:

1. Capacity building in Tabasco
 - 2-3 workshops to identify and prioritize the knowledge gaps
 - 6 PhD-projects (each 4-5 years) on selected topics, by Tabasco students, trained and supported by Mexican and Dutch scientists
 - 12 MSc-projects (each 4-8 months) on selected topics by Tabasco, other Mexican and Dutch students, trained and supported by Mexican and Dutch scientists
 - Exchange of staff between Tabasco, federal Mexican and Dutch universities and research institutes
2. Enhance scientific and modelling Tabasco climate research centre
 - Scoping workshop with experts from the Tabasco Climate Centre and Dutch research institutes to discuss and prioritize the development of modelling expertise
 - Implementation of selected scientific computer software
 - Training of the staff of the Climate Research Centre
 - Support and advise on modelling studies by staff members of the Climate Research Centre

Added Value Netherlands:

- High scientific reputation on water management and climate change adaptation
- Strong computer modelling reputation
- High quality scientific software, much of it 'open source'

Preliminary estimation budget:

1. Capacity building in Tabasco
 - Workshops and exchange of staff (costs of Dutch scientists): € 200.000
 - 6 PhD-projects (scholarships, expenses, scientific training/guidance): € 1.260.000
 - 12 MSc-projects (scholarships, expenses, scientific training/guidance): € 240.000
2. Enhance scientific and modelling Tabasco climate research centre
 - Scoping workshop (costs Dutch experts): € 45.000
 - Implementation scientific computer software & training: € 150.000
 - Modelling studies (support/advise by Dutch experts): € 100.000
 - Sediment balance estimates for the river system: € 120.000
 - Evaluate potential contributions to the increased sedimentation: € 90.000
 - Evaluation of the results and development of management strategies: € 55.000

3.7 TRANSBOUNDARY COOPERATION ON WATER MANAGEMENT OF THE UCAMACINTA RIVER

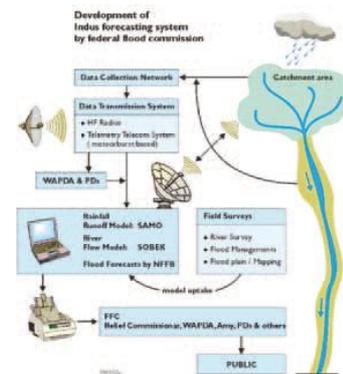
<p>Project name: Transboundary cooperation on water management of the Usumacinta River</p>	
<p>Introduction</p> <p>The Usumacinta river, one of the largest rivers in Mexico, originates in Guatemala. Managing river crossing border requires cross-boundary cooperation between states and nations. This is often very complex, not the least because of political differences. In the past decades the Netherlands succeeded in developing strong cooperation in river management with its neighbouring countries. An important step was the establishment of international commissions for the protection of the Rhine as well as for the Scheldt and the Meuse. Also cooperation in research and modelling of the river system added to the shared understanding of the different objectives. Sharing this experience with representatives of Tabasco and Guatemala authorities and scientists, might inspire parties and provides concepts to enhance collaboration in management of the Usumacinta river.</p>	
<p>Objectives</p> <p>The objectives for this proposal is the exchange of experience in cross-border river management</p> <ul style="list-style-type: none"> • Discuss the cross-border collaboration in the management of the river Rhine • Discuss the cross border collaboration in management of the Usumacinta river 	
<p>3. Plan of action: Organise a 10 day workshop on international collaboration in river management in the Netherlands and Germany</p> <ul style="list-style-type: none"> ▪ Information on the history of collaboration in management of the river Rhine ▪ Information on the cooperation on political level ▪ Information on the role of collaborative research ▪ Information on collaboration in river modelling and flood-forecasting ▪ Information on collaboration in ecological restoration of the river Rhine ▪ Information on Flood Risk Management of the River Rhine ▪ Visit to the Secretariaat of the River Rhine Committee (Koblenz, Germany) ▪ Visit to the Bundesanstalt fur Gewasserkunde / Chairman of the Hydrological Commission for the River Rhine (a collaborative research program) 	
<p>Added Value Netherlands:</p> <ul style="list-style-type: none"> ▪ Long standing experience in cross-border collaboration in river management ▪ The Delft-FEWS system is used in 40 countries all over the world 	
<p>Preliminary estimation budget:</p> <p>Assuming a 15 person delegation from Guatemala and Mexico (salaries etc. not included)</p> <p>Traveling costs, hotel, diners, etc. € 75.000</p> <p>Organisation, lectures, etc. € 60.000</p>	

3.8 IMPROVING THE EARLY WARNING SYSTEM

Project name: **Flood early warning system for Tabasco**

Introduction

Tabasco has been facing frequent flooding events in the past decades. These events are caused by heavy rainfall in the river basin and subsequent flooding of the river systems. Till recently no warning systems are available. In the past years the authorities invested in meteorological and hydrological monitoring systems. Next step is to come to flood forecasting systems, based on these monitoring data, meteorological forecasts and hydrological models. In the past decade Deltares developed Delft-FEWS¹. Delft-FEWS is an open shell for managing the data handling and forecasting process, especially develop for real-time flood forecasting in river systems, and storm surge forecasting at seas. This shell incorporates a comprehensive library of general data handling utilities, allowing a wide range of external forecasting models to be integrated in the system through a published open interface. Delft-FEWS is now used in 40 countries all over the world for river flood and storm surge forecasting.



Objectives

The objectives for this study are :

1. Develop an operational flood forecasting system for the major Tabasco river systems
 - Develop (or adapt) hydrological models for the major Tabasco rivers
 - Develop an operational forecasting system, based on Delft-FEWS
2. Train Tabasco staff in development, maintenance and use of operational forecasting systems
 1. Plan of action: Develop an operational flood forecasting system for the major Tabasco river systems
 - Phase 1: Inception mission& workshop to review availability of data and models, identify specific needs and elaborate the design of the forecasting system
 - Phase 2: Development and construction of the early warning system
 - Development and calibration of hydrological models
 - Configuration of the Delft-FEWS early warning system
 - Implement the operational client-server system
 2. Train Tabasco staff in developing, maintenance and use of operational forecasting systems
 - Initial training workshop on hydrological modelling and flood forecasting
 - Training workshop on hydrological modelling
 - Training workshop on Delft-FEWS configuration
 - FEWS-Tabasco user course

Added Value Netherlands:

- High scientific reputation in river flood forecasting
- The Delft-FEWS system is used in 40 countries all over the world

Preliminary estimation budget:

1. Develop an operational flood forecasting system for the major Tabasco river systems
 - phase 1: Inception mission& workshop: € 50.000
 - phase 2: Development and construction of the early warning system : € 340.000
2. Train Tabasco staff: € 90.000

Note that the budget does not include any hardware needed by the client, including 2 to 4 servers for the client server system.

3.9 A STUDY ON THE EROSION AND SEDIMENTATION IN THE GRIJALVA AND SAMARIA RIVER

Project name: **Sedimentation in the Rios Mescalapa, Samaria and Carrizal**

Introduction

In the past decades the sedimentation in the rivers Mescalapa, Samaria and Carrizal seems to have increased enormously. River sediments are causing problems in and near inlets of drinking water. The causes are not known yet. During the discussions the DRR-team had in March and June 2014, it was suggested that volcano eruptions some decades ago might have caused an increased sedimentation. Others suggest that the cause is the deforestation. Because the causes are not known yet, no management or adaptation strategies can be developed. Specific problems occurred during and after the construction of the Macayo structure in the river Carrizal. During the construction of the structure and after completion, a lot of sediment deposited in the river section upstream of the weir complex (photo). Although sedimentation is a problem in all 3 rivers, the rapid sedimentation near the new structure can only be explained by the construction of the weir system itself. This rapid sedimentation might on the long term lead to a strongly reduced discharge capacity of the Rio Carrizal, leading to problems with water supply from this river and increased flooding problems along the Rio Samaria. To come to management strategies a better understanding of the local sedimentation processes is needed.

The objectives for this study are:

1. Sedimentation near the Macayo structure
 - To explain the increased sedimentation near the Macayo structure;
 - Develop prognoses on the sedimentation and effects on river flows in the future;
 - To propose management strategies for the sediments near the Macayo structure.
2. Sediment transport and sedimentation in the Rios Mescalapa, Samaria and Carrizal system
 - To evaluate the development of sedimentation in the river systems in the past decades;
 - To analyse the causes of an increased sedimentation in the rivers;
 - To propose sediment monitoring and management strategies for the river system.



Plan of action:

1. Sedimentation near the Macayo structure
 - a. Evaluation of existing literature and data
 - b. Field visit and discussion with local experts
 - c. Setting up a computer model for the morphological processes near the Macayo dam, based on Delft-3Dⁱⁱ
 - d. Simulation and evaluation of the effects of construction of the Macayo structure (including the upstream "espigon")
 - e. Develop potential sediment management strategies (additional structures, small reconstructions, management of the weirs, dredging, ...)
 - f. Simulate and evaluate the effects of management strategies
2. Sediment transport and sedimentation in the Rios Mescalapa, Samaria and Carrizal system

For this study a stepwise approach is proposed, including:

 - a. Inception phase
 - i. To evaluate existing literature and data
 - ii. Evaluate literature and data in an expert workshop
 - iii. Initial specific-gauge analysis of hydrographic data
 - b. Field study
 - i. Field study with 3 Dutch experts (hydrologist, sedimentologist, river morphologist)
 - ii. Visit and evaluation of hydrographic stations
 - iii. Sample and analyse sediments at selected point in the river system

- c. Sediment balance estimates for the river system
 - i. Estimation of the sediment inflow at various stretches of the river system
 - ii. Final specific-gauge analysis of hydrographic data
 - iii. Quantification of sedimentation and erosion in various parts of the river system
- d. Evaluate potential contributions to the increased sedimentation
 - i. Estimate the development of sedimentation in the past decades, based on literature, field data and model calculations
 - ii. Proposal for a sediment monitoring program.

Added Value Netherlands:

- High scientific reputation on river morphology
- Long history of river sediment management
- Experience in modelling river morphology in many countries
- Open source DELFT3D software

Preliminary estimation budget:

1. Sedimentation near the Macayo structure: € 150.000
2. Sediment transport and sedimentation in the Rio Mescalapa, Samaria and Carrizal system
 - Inception phase: € 40.000
 - Field study: € 45.000
 - Sediment balance estimates for the river system: € 120.000
 - Evaluate potential contributions to the increased sedimentation: € 90.000
 - Evaluation of the results and development of management strategies: € 55.000

4 Follow up

Based upon the discussion with all actors during the mission we have detailed the identified priorities to assure that the decision makers have the information necessary to follow up on the allocation of the required funds to carry out the proposed projects.

Discussions with various decision makers have to lead to the required political support. Further brainstorming is required with the 'Comisión de Recursos Hidráulicos de la Cámara de Diputados Local'. It is proposed by the RNE to invite the commission members for a roundtable and discuss the identified issues and the role Dutch expertise could play. This could be an important item on the calendar of the second part of this follow up mission.

In July 2014 a meeting with federal Mexican and Tabasco state universities, together with 3 Dutch universities and 2 research institutes is organised to discuss cooperation in research projects and capacity building. During this meeting the research and capacity building priorities will be discussed, resulting in a working program proposal.

The mission recommends to further discuss the prioritized areas of interest and it is expected that during the coming months decision making will make clear which investments the state and federal governments are willing to make and which involvement of Dutch experts is to be expected. The results of this decision making process are very important in the detailing of the planning of meetings in September.

Furthermore we advise to plan a series of meetings in Acapulco to discuss the challenges of the state of Guerrero in to more detail and identify with Conagua which support is required and what the added value of Dutch experts can be.

For the second part of the follow up mission we suggest to organize a two week mission to Mexico to take place in Mexico DF (start and end), in Acapulco and in Villahermosa. For Federal as well as State level IWRM is an important issue as well as capacity building and modelling of river systems. Taking in to consideration that urban planning will be an important aspect for solving the problems in Acapulco as well as in Villa Hermosa, our advice would be to include the following expertise in the next mission:

- Integrated Water Resources Management (Team leader)
- Capacity building
- Modelling practices
- Urban water management

This follow up mission should lead to further commitment of the Mexican government at federal and state level for making optimal use of Dutch expertise in confronting the challenges that lie ahead.

Annex I Team members

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Kim Strengman	RNE	kimstrengman@hotmail.com	

Annex II Terms of Reference

TERMS OF REFERENCE FOR FOLLOW UP MISSION DRR-TEAM MEXICO

Project code: DRR14MX05

6th of June 2014

Introduction

An official requests for support from the DRR-Team on integrated flood/water management was sent to the Dutch Government on 28th of January from the National Water Commission, CONAGUA, the Government of the State of Tabasco and the municipality of Nacajuca in Mexico.

To meet the request a one week scoping mission was sent to Mexico, March 2014. The mission was very successful and requires follow up to explore the situation in more detail and work out opportunities.

Context

Many countries around the world face severe water threats. Often, these countries are in urgent need of expert advice on how to prevent a disaster or how to recover from a calamity. For instance, when a country has been struck by severe flooding and the first emergency relief workers have gone, the need for advice on how to build a sustainable and safer water future arises.

To meet these needs with a swift response, the Dutch government (Ministry of Foreign Affairs and the Ministry of Infrastructure and Environment) has initiated the Dutch Risk Reduction Team (DRR-Team). This team of experts advises governments on how to resolve urgent water issues related to flood risks, water pollution and water supply, to prevent disasters or to rebuild after water related disasters. The DRR-Team enables a foreign government to take action on the basis of sound advice and expertise. The DRR-Team is coordinated by the Netherlands Enterprise Agency (RVO).

Background (annex 1 summary of mission report, annex 2 mission report)

During the scoping mission three priorities at national level were identified for further cooperation. These include:

3. Coastal zone management: the innovative concept of building with nature was discussed and the application of the Sand Engine could be an interesting technique to combat coastal erosion at the Gulf of Mexico.
4. Integrated development plan for Guerrero: this plan for the State, the city of Acapulco and the upstream catchment of the Rio de la Sabána will help to mitigate effects caused by extreme weather events like the simultaneous occurrence of the storms Manuel and Ingrid. Combining spatial planning and water management in an urban development plan will offer opportunities to decrease probability of flooding and mitigate effects during such events.
5. Effective policy development, planning and implementation: the National Water Plan (2013-2018) has been presented recently. Next is to use this framework for defining more concrete initiatives and a methodology to monitor the process. Experience from the Netherlands can be of added value to reach these objectives.

At state level existing problems and future challenges were discussed for Tabasco. In November 2007, and September 2010 storms and heavy rainfall combined to deliver heavy and prolonged flooding to the state of Tabasco, south-east Mexico. Flooding resulted in large scale displacement of people and damage to

housing. In December last year (2013) torrential rains caused widespread flooding across Tabasco and again the state of emergency was declared. In 2013 Villahermosa was partly inundated, not as a result from flooding of the rivers but as a result of insufficient drainage capacity of the city.

The following priorities were identified during the working sessions:

- Elaboration of an integrated vision: this requires setting up the process architecture and institutional setting and a technical evaluation of the residual flood risks after all the measures taken as part of the PHI carried out by Conagua.
- Capacity building
- Transboundary river management: to improve management of the Usumacinta river
- Erosion and sedimentation in the water system
- Water plan for Villahermosa
- Nacajuca: special projects

Scope of Work

The DRR-Team is requested to second the Mexican Government for a follow up process to:

- Assist in prioritizing activities on national and state level (Tabasco and Guerrero) regarding water related issues.
- Advice what expertise at public & private level (ecological, hydrological, engineering, financial engineering, etc.) is required to support the challenges faced in Mexico in relation to integrated water resources management (IWRM) and flood risk management (FRM)
- Define a number (3 – 4) of high priority initiatives for which a plan of action for the coming period will be developed, from planning to implementation, including budgets and finance possibilities
- Advise on innovative financing modalities for the implementation of (priority) activities, including public finances as well as private financing and possibilities of international finance institutes.
- Identify potential Mexican partners to cooperate with in these projects, possible matchmaking with Dutch counterparts, and provide information on various Dutch parties that have added value to the challenges Mexico is facing related to water.

Approach

The follow up mission will be phased. The government of Tabasco is in the process of labelling their funds towards projects before the end of June. Therefore a small mission will take place around mid-June to assist the local government on setting priorities. A larger mission is staged around September. Thorough preparations before the mission should take place. It is required to anticipate on the priorities perceived by the Federal Government as well as by the Government of the State of Tabasco. Quick wins should be addressed immediately, while a more comprehensive approach is required for the long term developments. Both should be carried out consecutively with the appropriate stakeholders.

In advance, good knowledge about tendering procedures should be gained.

The mission will visit CONAGUA in Mexico DF and the state and local authorities in Tabasco and Nacajuca again.

The phased mission will include intensive cooperation with interested Dutch organizations in the Netherlands and proposals will have to be defined with Mexican counterparts and framed as such that costs for the implementation of the plans of actions can be covered by the Mexican counterparts. The embassy will assist in planning the agenda for the mission. These meetings and visits will be carried out with the RNE.

Objectives of mission

Advising our counterparts on follow up measures regarding the identified priorities during the scoping mission, and project acquisition / business development on behalf of the Dutch water sector to be able to build up sustainable cooperation on an equal basis between Mexico and the Netherlands.

Expected Results/Outcomes

- Plans of actions on quick wins
- Priority of 3-4 initiatives
- Comprehensive plans of actions for the identified priorities
- Proposals on how to finance and implement these plans of action
- Dutch businesses/organisations introduced as preferred partner in tender procedures
- Start-up of sustainable relationship with Mexico on equal basis

Output

As a joint effort of the team of experts the mission has to result in the provision of the following reports:

- A mission report, with a description of conducted activities, including findings and recommendations for further actions
- A roadmap for the Mexican authorities on how to set up a process and activities which will lead toward an integrated flood/water management vision for Mexico as a whole, Tabasco and Nacajuca, Guerrero (Acapulco)
- Draft project/ business proposals for cooperation between the Dutch water sector and Mexico.

In addition the following is asked;

- The findings, proposals and recommendations shall be presented in a reader friendly and professional manner and may include illustrations and photos;
- An electronic version of the final report along with all the relevant annexes;
- A summary of the results of the mission of maximum 2 pages, which can be used for publication on websites of EKN and RVO/drrteam.nl;
- Representative(s) of the expert team should be available to present the findings during a (sector) meeting in the Netherlands.

Required expertise

It is proposed that the mission consists of the following expertise:

- Team leader and expert in integrated water resources management and flood risk management;
- Business developer K2K – capacity building / modelling
- Business developer B2B – water plans / visions / building with nature / funding modes
- Business developer G2G – Transboundary river management, instruments policy evaluation

The mission will be accompanied where possible by an Embassy staff member.

Language

All reports, proposals and other communication will be in the English language with a management summary in English and Spanish.

Selection of experts

Experts will be selected based on the qualifications of the Curriculum Vitae, in relation to the described profiles in this Terms of Reference.

Administration

Contracting of the experts will be conducted by Netherlands Enterprise Agency. All documents should be sent to: administratiepvw@rvo.nl with a copy to Sandra Cats: sandra.cats@rvo.nl

Timing

Phased implementation in June and September 2014

Budget

Please note: The Dutch Water sector has made an agreement with DRR-Team to provide 1/6th part of the total DRR-Team budget. This means that a discount of 18,51% should be applied on the tariffs of the consultants.

Each individual expert for this mission is expected to provide an all-inclusive detailed budget including the fees and expected expenditures in order to conduct this assignment. While presenting a total budget for this assignment, the following items must be specified:

- Curriculum Vitae;
- Fees for working days abroad (long term) and travel days for the experts including days for preparation and a couple of day's availability for feedback to the sector and principal after the mission. The team leader is responsible for the final report and may add some days of report writing in the Netherlands and extra days for preparation for the mission.
- Expenditures eligible for reimbursement and specified for accommodation and travel expenditures, based on the schedule of daily subsistence allowance rates (DSA), used by the Dutch Ministry of Foreign Affairs. The maximum rates are as follows:

	Accommodation	Other costs
Location		
Mexico DF	Max. € 128	Max. € 105
Tabasco	Max. € 196	Max. € 84

Annex III Programme Países Bajos

Programa de la delegación de la Comisión Nacional del Agua a los Países Bajos

Integrantes de la delegación

- Dr. David Korenfeld Federman.- Director General
- Lic. Victor Hugo Iglesias Perez
- Dr. Felipe I. Arreguin Cortes.- Subdirector General Técnico.
- Ing. Antonio Gutierrez Marcos.- Director Local Tabasco.
- LRI. Claudia Coria Bustos Pérez.- Gerente de Cooperación Internacional.

Acompañantes durante la visita en los Países Bajos

- Excmo. Embajador Eduardo Ibarrola Nicolín
- Excmo. Embajador Dolf Hogewoning
- Lic. Lourdes Suinaga – Jefe del Departament
- Lic. Eduardo Islas
- Lic. Judith Blaauw – Asesora Senior del Departamento Económico
- Corinne van Voorden – ARCADIS
- Klaas de Groot – ARCADIS
- Gerard Blom – Deltares
- Bas van de Pas
- Aleid Diepeveen - NWP

Domingo 15 de junio	
9:30-11:00	Traslado del Hotel hacia el Keringshuis. En el Keringshuis recibirán un tour con un guía profesional quien informará sobre la historia de los Deltawerken y el Maeslantkering en especial. Se juntarán al grupo unos representantes de las empresas Deltares y Arcadis quienes han estado involucrados en la cooperación bilateral entre ambos países y que forman parte del Dutch Risk Reduction Team.
11:00-12:30	Llegada al Keringshuis Maeslantkeringsweg 139 3151 ZZ Hoek van Holland Tel.: (+31)-(0)174-511222 The Keringshuis, is the Public Water Management Information Centre about flood risk management in the Province of Zuid-Holland and the impressive Maeslant Storm Surge Barrier. The Keringshuis shows how the Dutch still manage to keep their feet dry in this water-rich Province. This sorm surge barrier is the last part of the Dutch Delta Works and is the world's largest moveable barrier.
12:30	Salida del Keringshuis hacía el restaurante del Hotel Atlantic en La Haya (Kijksduin)
13:00	Comida. Este comida se dará con vista al Motor de Arena. Esperamos que durante esta comida se pueda profundizar un poco más sobre el enfoque de la cooperación en el Estado de Guerrero así como cualquier otro punto que sea de interés de los diferentes partes.

14:30	Saldremos afuera para ver al Sand Engine más de cerca y hablar sobre este proyecto mismo.
15:15	Salida al Katwijk aan Zee. Esta visita reemplaza la visita al Biesbosch por tener disponible a un ingeniero costal que nos puede dar una explicación sobre el proyecto de uno de los puntos débiles en la costa y como se manejó la problemática ahí.
15:45	Llegada a Katwijk aan Zee.
17:00	Salida de Katwijk aan Zee y traslado hacia Amsterdam al hotel Waldorf.

Annex IV Programme Tabasco

Agenda de Trabajo

Equipo Holandés de Reducción de Riesgo.

Asistentes:	Klaas de Groot; Arcadis. Gerard Bloom; Deltares. Kim Strengman; Embajada de Holanda. Jaap Veerman; Ministro Consejero-Embajada de Holanda. Lic. Herminio Silvan Lanestosa; Subsecretario de Desarrollo Industrial y Comercio – SDET
Fecha:	17 al 19 de Junio de 2014.
Lugar:	Estado de Tabasco
Hotel sede:	Hotel Cencali

Lunes 16 de Junio	
11:00 p.m.	Arribo al Aeropuerto Internacional de la Ciudad de Villahermosa y Traslado al Hotel Cencali.
Martes 17 de Junio	
11:00 – 13:00	Reunión de Trabajo con el DR. JOSÉ MANUEL PIÑA GUTIÉRREZ; Rector de la Universidad Juárez Autónoma de Tabasco. Lugar: UJAT Duración: 2 horas.
13:00 – 16:30	Traslado al Hotel y espacio para comida.
17:00 – 19:00	Reunión con el Q.F.B. CÉSAR FRANCISCO BURELO BURELO; Coordinador General de Protección Civil Lugar: Protección Civil Duración: 2 horas.
19:00 – 21:00	Reunión con el ING. MANUEL FELIPE ORDOÑEZ GALÁN; Secretaría de Ordenamiento Territorial y Obras Públicas Lugar: SOTOP Duración: 2 horas.
21:00	Traslado al hotel (Pernocta)
Miércoles 18 de Junio	
09:00 – 11:00	Reunión con el ING. ALEJANDRO DE LA FUENTE GODÍNEZ; Director General de la Comisión Estatal del Agua y Saneamiento Lugar: CEAS Duración: 2 horas.
11:00 – 13:00	Reunión de trabajo con el ING. JAIME IZQUIERDO COFFIN; Coordinador General del Sistema de Agua y Saneamiento. Lugar: SAS Duración: 2 horas.

13:00 –15:00	Reunión con el LIC. PATRICIO BOSH HERNÁNDEZ; Comisión de Recursos Hidráulicos de la Cámara de Diputados Local. Lugar: Duración: 2 horas.
15:00 –17:00	Comida
17:00 –19:00	Reunión con el LIC. GERARDO GAUDIANO ROVIROSA; Comisión de Recursos Hidráulicos de la Cámara de Diputados Federal. Lugar: Duración: 2 horas.
19:00	Traslado al hotel (Pernocta)
Jueves 19 de Junio	
09:00 – 10:30	Reunión de trabajo con el PROFR. PEDRO LANDERO LÓPEZ; Presidente del Municipio de Nacajuca. Lugar: Sala de Juntas del Secretario - SDET Duración: 1:30 minutos.
11:00 – 13:00	Reunión de trabajo con el ING. ANTONIO GUTIERREZ MARCOS; Director Local de la CONAGUA. Lugar: Oficinas CONAGUA Duración: 2 horas.

ⁱ More information on Delft-FEWS: <http://www.deltares.nl/nl/software/479962/delft-fews>

ⁱⁱ Delft 3D is open-source computer software developed, managed and supported by Deltares for hydrodynamics, morphology and water quality in aquatic systems:
<http://www.deltares.com/hydro/product/621497/delft3d-suite>