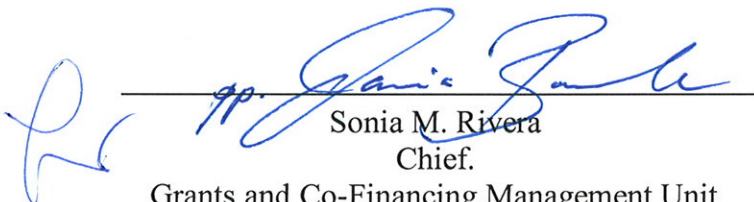


**DECISION THEATER FOR AN EFFECTIVE WATER RESOURCES
MANAGEMENT IN LATIN AMERICA**

RG-T2390

CERTIFICATION

I hereby certify that this operation was approved for financing under AquaFund (AQF) through a communication dated on October 21, 2013 sent by Gerhard Lair, (ORP/GCM.) Also, I certify that resources from the AquaFund (AQF) are available for up to US\$1,500,000 in order to finance the activities described and budgeted in this document. This certification reserves resources for the referenced project for a period of four (4) calendar months counted from the date of eligibility. If the project is not approved by the IDB within that period, the reserve of resources will be cancelled, except in the case a new certification is granted. The commitment and disbursement of these resources shall be made only by the Bank in US dollars. The same currency shall be used to stipulate the remuneration and payments to consultants, except in the case of local consultants working in their own borrowing member country who shall have their remuneration defined and paid in the currency of such country. No resources of the Fund shall be made available to cover amounts greater than the amount certified herein above for the implementation of this operation. Amounts greater than the certified amount may arise from commitments on contracts denominated in a currency other than the Fund currency, resulting in currency exchange rate differences, for which the Fund is not at risk.



Sonia M. Rivera
Chief.
Grants and Co-Financing Management Unit
ORP/GCM

12/11/2013
Date

TC Document

I. Basic Information

Country/Region:	Regional
TC Name:	Decision Theater for an Effective Water Resources Management in Latin America
TC Number:	RG-T2390
Team Leader/Members:	María Eugenia de la Peña (WSA/CME), Team Leader; Fernando Miralles (INE/WSA), Alternate Team Leader; Raúl Muñoz, Irene Cartin and Roxana Chavez (INE/WSA); and Juan Carlos Pérez-Segnini (LEG/SGO)
Date of TC Abstract authorization:	October 18, 2013
Beneficiary:	Regional – Professionals, national and subnational government entities, universities and companies involved in the use and management of hydric resources
Executing Agency and contact:	Instituto Tecnológico de Monterrey. Jürgen Mahlknecht, Director of the Water Center for Latin America and the Caribbean.
Donors providing funding:	AQUAFUND (Ordinary Capital)
IDB Funding Requested:	US\$1,5000,000
Local counterpart funding:	FEMSA: US\$800,000 ITESM: US\$800,000 TOTAL: US\$1,600,000
Disbursement period:	42 months
Required start date:	January 2014
Types of consultants:	Individuals & Academic Institutions
Prepared by Unit:	WSA/CME
Unit of Disbursement Responsibility:	WSA/CME
TC Included in Country Strategy:	N/A
TC included in CPD:	N/A
GCI-9 Sector Priority:	Environmental Sustainability

II. Objectives and Justification of the TC

- 2.1 Meeting water needs in a sustainable manner has been widely recognized as a key area of need by the IDB and other organizations. Due the complexity of water issues, it has become increasingly clear that they require an interdisciplinary management approach called “Integrated Water Resources Management” (IWRM), an approach that was developed in the 1980s, and that the IDB formally embraced through its “IWRM Strategy” (IDB, 1998). An integrated approach incorporates interests like environment, safety, health, nature development and management, liveability and cultural/historical heritage, economic interests, and social interests. Its aim is to provide insight into all aspects of the problem, in order to reach a balanced and sustainable decision. Effective environmental policy and decision-making requires linking knowledge and action through coordination and communication between individual and institutional actors spanning scientific and political spheres.
- 2.2 One of the main difficulties in this context is the communication gap between science and management, and the dispute of scientific knowledge by decision makers. In this sense, model based decision-support tools have become increasingly popular for linking environmental science and policy in coupled human-ecological system. Examples from the water context include: (a) the Water Information System for Europe, which provides information about water quality, quantity, and legislation through online ‘water live maps’; (b) RiverWare, generalized river basin modeling and simulation tool; and

(c) WEAP, a water evaluation and planning simulation for integrated water resources management; MODFLOW, a three-dimensional finite-difference groundwater model from the US Geological Survey.

- 2.3 Such models offer decision-support and have obtained significant investment from science funding agencies in Europe and U.S.A. (Borowski and Hare, 2007), however, identified 'evidence of a mutual misunderstanding' and gap between water managers and researchers centered on the role and importance of such models, the transferability of models to specific settings, the role of participatory modeling in water management, a lack of confidence in models, the need for improved user interfaces, and model integration. The authors concluded that structural differences between research and policy communities (e.g. divergent interests, accountability, and reward structures) lead to different attitudes toward basic assumptions about the role of models in water management.
- 2.4 Boundary organizations are institutions, such as policy-relevant research centers, positioned in the overlapping space of scientific research and political decision-making. They are not only good for helping to interpret and manage the production of scientific knowledge and its implementation in policy making, but offer also an opportunity for water science and policy communities to reconcile structural differences through co-adaptation.
- 2.5 A decision theater for IWRM is a promising boundary organization which is characterized by boundary processes: stakeholder meetings designed to reconcile the often divergent priorities of science and policy communities; data-sharing to maximize scale dependent comparative advantages; and socio-ecological modeling, including tools for visualization, simulation, collaboration, deliberation and decision support; participation by actors on both sides of the boundary (scientists and decision makers), as well as professionals who serve in a mediating role.
- 2.6 In November 2008, the Water Center for Latin America and the Caribbean emerged as a joint initiative of IDB, Instituto Tecnológico de Monterrey (ITESM) and Fomento Económico Mexicano, S.A.B. de C.V. (FEMSA Foundation) focused on developing capacities, generate and disseminate knowledge on water management in the region through research, education and dissemination programs. The Center was created as a response to the increasingly complex water and environmental problems faced during the last decades, while a sectorial decentralization process diluted responsibilities between multiple and heterogeneous subnational actors which do not count on sufficient capacities to attend sectorial needs.
- 2.7 During a previous Bank Technical Cooperation (TC) project (ME-T1988), the Bank, jointly with the Water Center, ITESM and FEMSA Foundation, developed a pilot project to demonstrate the applicability of a decision theater approach for IWRM in the Río San Juan basin in northern Mexico. This pilot project linked physical and social scientists, educators, economists and legal experts, decision-makers and stakeholders in the water planning process at the basin scale. The project drew on methods developed and applied at Arizona State University (ASU) to employ boundary organization and integrated strategic planning as well as exercise-based capacity building processes. Planning was informed and integrated with expertise in basin observation efforts at Arizona State University and supported by interactive modeling. The knowledge produced in this previous TC resulted in a decision making support approach that can be used by local, state and regional agencies to: (i) plan water resources management issues in arid areas using a multi-sector approach; (ii) policy development in an in-situ stakeholder setting, i.e., the inputs necessary for policy development was generated in real time with stakeholders present and in an interactive fashion; and (iii) be a changeable template for other planning and policy development projects in arid areas in the LAC region, and as input for other TCs (such as this) and strategy documents for INE/WSA and for countries in the region.

- 2.8 Based on the above, the objective of the TC is to support the establishment of a decision theater as a research and applications tool within the Water Center, and the development of accompanying tools and practices for water resources management in pilot studies as a collaborative approach with actors, contributing to bridge the identified gaps of decision making processes in the Latin American water sector in order to: i) fulfill the needs of Latin American stakeholder regarding decision making capabilities and policy making in reference to water projects; ii) foster capabilities of knowledge-based decision making in decentralized, consensus-driven water management projects of Latin America's water authorities; iii) create technical expertise in Latin America on developing user-friendly decision-making tools and practices; and iv) disseminate the findings of the decision-making experience with interested institutions.
- 2.9 This project is aligned with the sector priority lending target of "protect the environment, respond to climate change, promote sustainable energy and ensure food security" of the Report on the Ninth General Increase Resources (GCI-9) of the Bank.

III. Description of activities, budget and outputs. The proposed TC entails the following activities, outputs and results:

- 3.1 **Demand analysis with identification of potential users and opportunities for collaboration.** The first project activity will be the analysis of the demand for a tool that supports decision making processes in the water sector in the region using advanced visualization techniques and real-time enabling technologies, both included in the decision theater approach. The analysis will be based on the general information about water management and the problems identified in a sample of countries that will be considered as representative at a regional level. The information contained in official national reports will be taken, but a series of interviews with key people will be addressed. The demand analysis will contain at least the following items: a) description of the general aspects and needs of the water sector in Latin America and the Caribbean with regard to integrated water resources management; b) analysis of decision-making style in the different selected countries; c) prioritized list of the potential clients/users, at country level; d) analysis of possible competitors and collaborators; e) identification of current and futures barriers; and f) identification of opportunities for use of the decision theater in this TC (for two case studies as outlined below). The information derived from this demand analysis should be sufficient to design an approach strategy for application and dissemination of the decision theater to be developed at the Water Center.
- 3.2 **Establishment of a Decision Theater at the Water Center of Latin America and the Caribbean.** The solution of a specific problem in the water sector involves a number of actors and stakeholders with divergent objectives, and in some cases with conflicting interests. In this sense, a physical location, technically prepared in order to facilitate and favored the visualization of constraints, impacts, and advantages of a given scenario in almost real time, results to be an excellent tool for modern decision making. A physical infrastructure is an appropriate environment because it helps the participants to share their ideas and to have the willingness to see the problems through the eyes of other stakeholders. This activity consists on the conceptualization of the decision theater: i) the establishment of the physical infrastructure of about 260m² at the ITESM, financed through counterpart funds, for the implementation of The Decision Theater's activities; ii) conformation of the core executive unit (coordinator, manager, and administrative support); iii) hiring of technical and research personnel to develop technical infrastructure, create compute models and organize workshops; iv) adaptation of available physical space and the civil works required; v) acquisition of the visualization equipment and furniture, set up of a computer cluster for the operation of the computer

models, in principle, the idea is that the visualization system is based on the use of high-dimension LED screens; and vi) software licenses used for all modeling activities are acquired.

- 3.3 In order to build on the experience gathered through the execution of operation ME-T1188, the Water Center will retain the advisory services of ASU's School of Sustainability. The experience of ASU in developing and structuring its Decision Theater (<http://dt.asu.edu>) as a boundary organization at the interface of science and policy and using it in a translational role, converting the products of water science into tools for better decision making under uncertainty will be key in this TC project. This translational role involves integrating climate and hydrological research results into regional assessments of vulnerability, including factors such as population growth and land-use change, cultural attitudes, and the capacity for institutions and legal frameworks to respond to the uncertainties of climate change and human conditions. Through this expertise, the Water Center will seek to link physical and social scientists, educators, economists and legal experts, decision-makers and stakeholders in the water planning process at the watershed scale. To this end. This TC will draw on methods developed and applied at ASU to employ boundary organization and integrated strategic planning as well as exercise-based capacity building processes. Planning will be informed and integrated with expertise in basin observation efforts at Arizona State University and supported by interactive modeling.
- 3.4 **Development of case studies in two Latin American Countries.** This activity includes the selection of two pilot cases. The first case study will be developed for a watershed in Mexico. The selection of the second watershed for application outside of Mexico will be based on the results of the demand analysis, considering its underlying IWRM problems, the interest of the local government and local research institutions and stakeholders. Once finished, the two pilot cases are aimed at being successful showcases of the Decision Theater. For each case the following activities will be developed: i) an institutional framework analysis and decision mapping: institutions, policies, and programs are analyzed; consultations of local key stakeholders are carried out to understand the present decision making process; ii) information development: existing information (studies, data) is gathered, recompiled and analyzed; a data base is established for each pilot case; complementary field survey are done only where necessary and guided by stakeholder and/or modeling needs; iii) modeling of components according to the needs of each case considering: surface water (climate scenarios, surface balance, surface quality), groundwater (groundwater balance, groundwater quality), water management (water demand), water economics (socio-economy, agronomy), ecology (terrestrial, aquatic), and land resources (land use, crop productivity); iv) integrated modeling with dynamic simulations, visualization routines and analysis, and evaluation modules that will give the objective support to each of the proposed and tested scenarios; the outcomes will provide the information necessary for the decision-making process through workshops mediated by a professional. At least three workshops with key stakeholders using the Decision Theater are considered in each pilot case. The implementation of a mobile version of the Decision Theater and organization of local workshops at the expense of the clients/users may be considered.
- 3.5 **Network of best practices.** For this activity, a communication strategy to deliver the Decision Theater approach and findings/results of the two proposed case studies will be developed. Based on the results of a previous Bank TC (RG-T1638), the Water Center launched the existing LatinAqua network for such purposes. This is an academic network aimed at collaboration in training and research and created to share the best experiences in the water sector. LatinAqua is currently operated by the Water Center in collaboration with a dozen of other recognized institutions. Information provided by members of the network will be analyzed with the aim of building relevant indicators and index costs that will serve as an input for the impact evaluation and the results generation during the simulation of scenarios in the

decision theater. This may lead to the implementation of decision theaters in other countries of the region or to establish the mechanism of collaboration between the different institutions in this type of projects. By the end of the project, a database of best practices, the key indicators, and index costs regarding different projects in the water sector will be available. On the other hand, the information platform of the Water Center which hosts currently about 500 classified documents from all over the region will be amplified and updated with new cases, in order to provide important background information for the TC available to the general audience. In principle, the network consists of 10 members which meet once a year.

- 3.6 **Outreach for disseminations and capacity building workshops.** This activity consists on the translation of the findings into practice-based guidance for the provision and use of decision tools in the two case studies. This activity aims to promote a better institutional framework and technical capabilities in order to diminish the barrier usually existing between science and decision makers. This closing activity will enable the creation of a common framework within the case studies for supporting effective decision making among stakeholders. This activity will support to reduction of the communication gap that exists between different authorities, users and experts.
- 3.7 The project will be complemented with a dissemination plan, including appropriate manuals; online web contents describing the processes and outcomes, their strengths and limitations. The results of the studies carried out and the referred best-practices and techniques will be disseminated through capacity building workshops to take place within the study areas and other locations in Latin America interested in implementing knowledge-based decision making in water management; and the link to the IDB countries in order to use the tool in its different operations. This will help to reduce the communication gap that exists between different authorities, users and experts. A web page is established and maintained monthly hosting interesting digital media products and links. Papers are produced for science and popular-science journals.
- 3.8 The expected outputs and results are presented in the following Indicative Matrix Results:

Outcomes	Indicator	Base Line	Meta
Number of times the pilot project has been scaled-up or replicated in other interventions	Number of times	0	5
Number of times knowledge produced has been used as input for programming and strategy documents	Number of times	0	5
Outputs			
Demand diagnosis generated	Diagnosis	0	1
Diagnosis of the development and strategy for physical installation of the DT implemented	Diagnosis	0	1
Pilot projects implemented	Project	0	2
Diagnosis on institutional framework and decision mapping completed	Diagnosis	0	1
New database with information of the pilot cases generated	Database	0	1
Technical note on best practices for the provision and use of decision tools in the two pilot cases completed	Note	0	1
Manual of the Decision Theater completed	Manual	0	1
Workshops on IWRM and Decision Making delivered	Workshop	0	5
International conferences organized	Conference	0	3
Scientific publications elaborated	Publication	0	5

- 3.9 The total cost of this TC is US\$3,100,000, of which US\$1,500,000 will be provided by the resources of the Ordinary Capital of Aquafund and the remaining equivalent of US\$1,600,000 resources from FEMSA and ITESM as in-kind contribution. The budget by activity is presented below:

Indicative Budget (US\$) [IDBdocs38256157](#)

Activity/Component	IDB	Counterpart Funding		Total Funding
		Fundación FEMSA	ITESM	
1. Identification of potential users and opportunities	80,000			80,000
2. Establishment of Decision Theater	565,216	131,078	420,502	1,116,796
3. Development cases in 2 Latin American countries	556,344	461,693	210,586	1,228,623
4. Network of Best Practices	112,800	92,736	48,192	253,728
5. Outreach for dissemination and capacity building workshops	155,640	13,306	86,570	255,516
Administration	-	101,187	34,150	135,337
Evaluations and Audits	30,000	-	-	30,000
Total	1,500,000	800,000	800,000	3,100,000

IV. Executing agency and execution structure

- 4.1 The TC will be executed by the Instituto Tecnológico de Monterrey, who also executed a previous TC for the Bank (RG-T1638) which created the Water Center at the ITESM. The ITESM is a private, non-profit, independent academic institution founded in 1943. Its work is supported by civil associations and enjoys nationwide community support, with proceeds earmarked for the expansion of the institution's scholarship program as well as investment in infrastructure. Today, it is a multi-campus university system with 33 campuses throughout Mexico. It has also established an international presence through our 21 sites and numerous liaison offices in 12 foreign countries, offering information and continuing education programs, and carrying out consulting and research projects. Its educational offering consists of a wide assortment of undergraduate majors, specializations, master's degrees and Ph. D. programs.
- 4.2 FEMSA Foundation, as a partner for the Water Center and the Decision Theater, is a second floor organization, not in charge of operating the projects it supports, but seeks to fund valuable proposals with monetary and/or non-monetary resources. Since its inception, the Foundation supports projects in Latin America and the Caribbean aimed at two programs: Sustainable Development, focused on water resource conservation, and Quality of Life, focusing on improved nutrition and health. Both are backed by strategic support to education, science and technology involved in these issues.
- 4.3 The execution of this TC will provide a learning, knowledge transfer and data gathering opportunity for the staff of the Water Center of Latin America and the Caribbean and the Water and Sanitation Division of the Bank, which is a relatively new area of work that both institutions have engaged in recently.
- 4.4 **Execution structure:** It is proposed an execution and disbursement period of 36 and 42 months respectively from the time of signature of the non-reimbursable technical cooperation agreement. The Bank will make the disbursements according to the prepared schedule and timing of due payments.
- 4.5 The main duties and responsibilities of the ITESM are: i) to perform financial management of the project; ii) selection and hiring of professor/researchers and support staff; iii) carry out the procurement of goods and services; iv) prepare terms of reference for the respective contracts and

acquisitions; v) take leadership and regional coordination with all relevant stakeholders to achieve the progress of activities on schedule; vi) prepare progress and final reports; and vii) ensure the achievement of the objectives and goals set for the project.

- 4.6 The contracting and procurement processes will be done in accordance with the Bank's policies and procedures (documents GN-2349-9 and GN-2350-9) and the procurement plan. For the selection and contracting of personnel (teachers/researchers), the ITESM procedures will be followed, as eligible expenses, in accordance with the Bank's technical cooperation policy (GN-2470-2).

V. Major issues

- 5.1 The primary risk for implementation of this TC is the lack of commitment over time of the institutions and stakeholders involved in implementing the decision-based policies. To mitigate this risk, it is proposed that: i) the first case study should be developed in the country of the executing agency (Mexico); ii) previous conversations with water resources management agencies/authorities in the selected case studies are initiated after Activity 1. In addition, and as starting point a first recognizance mission is proposed to be carried out jointly with the Bank, with the objective of engaging local key stakeholders by discussing the objective of the studies and services to be developed.
- 5.2 An additional risk is the lack of experience with participative decision making using decision theaters throughout the region. To mitigate this risk, it is proposed to consider the collaboration of an experienced institution in developing the case studies. Arizona State University and Stockholm Environmental Institute have offered their technical assistance. In addition, a peer review of all outputs of this TC is foreseen by at least 2 anonymous reviewers (one within the Bank and one outside the Bank) to insure quality of the TC deliverables.
- 5.3 Lastly, the lack of institutional engagement from implementing institutions is also a risk. This risk will be mitigated through the use of a communication strategy implemented by the LatinAqua network which already counts on engaged partners throughout the LAC region.

VI. Exceptions to Bank policy

- 6.1 This operation does not consider exceptions to Bank policies.

VII. Environmental and Social Strategy

- 7.2 According to the Environment and Safeguards Compliance Policy, it has been determined that this project will not cause negative environmental or social impacts, since the TC objective is the generation and dissemination of knowledge as well as research and training programs, so it is classified as Category C. ([IDBdocs38256197](#))

Required Annexes:

- Annex I: [Letter of Request](#)
Annex II: [Terms of Reference](#)
Annex III: [Procurement Plan](#)