HYDRO-ECONOMIC MODELLING

INTEGRATED MODELLING TO TACKLE MULTIPLE WATER MANAGEMENT DIMENSIONS

Background

A hydro-economic model is both a computational method and a tool to analyze water resources management problems.

As its name indicates, hydro-economic modelling combines economic management concepts with an engineering level of understanding of a hydrologic system. Hydro-economic models integrate spatially distributed water resources, economic values, infra- structure, and management policies. The models can optimize water allocation between different uses across time and space taking into account various physical, economic, environmental and institutional constraints.

Hydro-economic models have emerged as an effective tool for studying various water resources management problems around the globe: inter-sectoral water allocation, reservoir operation, transboundary water management, conjunctive management, water-food-energy nexus, climate change adaptation, investment planning, etc.

The online administered training will provide a thorough introduction on the approach of hydro-economic modelling, both for watershed and international basins scenarios to illustrate its scopes and benefits. A review of the economics principles at the basis of models will be presented and the different components to be considered for the development of models will be defined.

The relevance of modelling will further be demonstrated through the illustration of both technical and policy outputs and the session will conclude with a discussion on the development of the approach and the way forward.

The different topics will be addressed by international renowned experts from the different generations of hydro-economic modellers, who will contribute through live presentations fand recorded interviews. In addition, a number of case studies will be illustrated to demonstrate the potential application of modelling under different scenarios. Finally, the long-standing work of FAO on this topic and in different contexts will be presented.

Training goal and objectives

The training aims at enhancing the capacities of participants from a variety of national institutions of Mali, Niger and Libya on several topics:

- Importance, benefits and constraints of hydro-economic modelling in different contexts;
- Modelling approaches;
- The state of the art of hydro-economic modelling;
- The contribution of hydro-economic modelling in policy making.

Approach

In accordance with above-mentioned objectives, a 2-day administered e-training has been designed. The main tools used are live and recorded presentations by international experts on several topics related to hydro-economic modelling on the e-learning platform (Adobe Connect). Each session begins with a learning module in the form of a virtual class to introduce the subject provided by the trainer, followed by interactive questions and answers sessions to facilitate the interaction and open discussion with trainees. The theoretical contents presented are further illustrated through video materials. The training will be carried out in two languages, English and French, with the support of live interpretation.

SCHEDULE

CONTEXT AND THEORY

10.30-10.40	**Welcome speech and structure of the course**		Stefania Giusti (FAO)
10.40-10.50	**Opening remarks**		Maher Salman (FAO)

Session 1. Introduction

10.50-11.10	**Introduction to Integrated Water Management**	*Presentation*	Andrea Rinaldo (Lausanne Federal Institute of Technology)
11.10-11.20	**Ice-breaker poll**	*Ice-breaker poll*	Thibaut Lachaut (FAO)
11.20-11.40	**Introduction to hydro-economic modelling (HEM)**	*Presentation*	Tingju Zhu (Zhejiang University, China)
11.40-11.50	**Interview – Economic modelling of water: why do we need it?**	*Pre-recorded video*	Jay Lund (University of California Davis, USA)
11.50-12.00	**Q&A session**		
12.00-13.30	**Lunch break**		

Session 2. Economics concepts of HEM

13.30-13.50	**Cost, price, value(s) of water**	*Pre-recorded presentation*	Claudia Casarotto (Innovation for Poverty Action)
13.50-14.00	**World Water Day 2021: what does water mean to you?**	*Video*	FAO
14.00-14.20	**Micro-economics: demand, supply, equimarginalism, shadow value**	*Presentation*	Tewodros Kahsay, (Addis Ababa University, Ethiopia)
14.20-14.30	**Q&A session**		
14.30-14.45	**Break**		
14.45-15.00	**Case study: water-food-energy nexus**	*Presentation*	Maria Blanco, Universidad Politécnica de Madrid (Spain)
15.00-15.15	**Recovering ecosystem services in hydropower-dominated river basins**	*Presentation*	Guilherme Fernandes Marques (Universidade Federal do Rio Grande do Sul, Brazil)
15.15-15.25	**Q&A session**		
15.25-15.30	**Day wrap-up**		

HEM DEVELOPMENT

Session 1. HEM approaches and components

Time	Title	Format	Speaker
10.30-10.50	**Water resource system representation**	*Pre-recorded presentation*	Charles Rougé (University of Sheffield, UK)
10.50-11.00	**Interview: HEM for agricultural uses**	*Pre-recorded video*	Josué Medellín-Azuara (University of California Merced, USA)
11.00-11.20	**Principles of allocation and modelling**	*Presentation*	Manuel Pulido-Velázquez (Universitat Politèctica de València, Spain)
11.20-11.30	**Q&A session**		
11.30-11.45	**Break**		

Session 2. HEM in action

Time	Title	Format	Speaker
11.45-12.05	**HEM for river basin management – Outputs and performance indicators**	*Presentation*	Amaury Tilmant (University of Laval, Canada)
12.05-12.15	**Interview: HEM as a decision-support system**	*Pre-recorded video*	Ivo Mello (Instituto Rio Grandense do Arroz IRGA, Brazil)
12.15-12.35	**Case study: adaptation to climate change**	*Presentation*	Tingju Zhu (Zhejiang University, China)
12.35-12.45	**Q&A session**		
12.45-14.00	**Lunch break**		

Session 3. Current trends in HEMs

Time	Title	Format	Speaker
14.00-14.20	**HEM challenges and the way forward**	*Pre-recorded video*	Daniel Peter Loucks (Cornell University, USA)
14.20-14.35	**Hydro-economic models**	*Presentation*	Daniel Peter Loucks (Cornell University, USA)
14.35-14.45	**System dynamics for conjunctive use of groundwater and surface water – Case study: Spanish water resources system**	*Presentation*	Adrià Rubio-Martín (Universitat Politèctica de València, Spain)
14.40-15.00	**Break**		
15.00-15.15	**Use of HEM for decision-making**	*Presentation*	Frank Ward (New Mexico State University, USA)
15.15-15.30	**Water vulnerability in the Euphrates-Tigris basin**	*Presentation*	Charles Rougé (University of Sheffield, UK)
15.30-16.00	**Q&A session and day wrap-up**		

The Building Forward Better Initiative

Conflict and fragility are at the core of some of the biggest challenges today – they are able to hinder development progress and reverse any development gains. Environmental factors are rarely, if ever, the sole cause of conflicts and vulnerability. However, the exploitation of natural resources and related environmental stresses can be implicated in all phases of the conflict cycle from contributing to the outbreak and perpetuation of violence to undermining prospects for peace.

A fundamental problem in fragile contexts is the loss of human capital. Without the contribution of knowledgeable professionals, the re-building process becomes even more complicated. Local capacities should be at the base of any re-building planning and investments, as they provide access to local knowledge and information and can guarantee the sustainability of the program in the long-term.

Indeed, effective institutions are central to address both the "capacity deficit" and "legitimacy deficit" faced in fragile contexts. Recognizing the importance to invest in human capital, the "Building Forward Better" Initiative of FAO promotes a blended training methodology, composed of administered and self-administered online and face-to-face training, addressing a series of topics in the domain of natural resources management.

The Initiative aims to reduce the knowledge gap and strengthen national institutions to enhance agricultural productivity, improve food security and, ultimately, contribute to peaceful societies for sustainable development

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